RETURN:

METROPOLIS DRAINAGE.

Ordered, by The House of Commons, *to be Printed,*
11 *April* 1854.

[*Price 2s. 6d.*]

180.

Under 2 lbs.

1854. LXI. 113.

METROPOLIS DRAINAGE.

RETURN to an Address of the Honourable The House of Commons, dated 27 March 1854;—*for*,

"COPIES or any REPORTS and COMMUNICATIONS made by the Board of Health to the Secretary of State for the Home Department, in reference to the DRAINAGE of the METROPOLIS; together with COPIES of CORRESPONDENCE on the Subject, and of any PLANS and ESTIMATES which may have been forwarded to the Home Office by the Board of Health, with the Names of the ENGINEERS and SURVEYORS by whom such Plans and Estimates may have been made:"

"And, of all CORRESPONDENCE that may have passed between the Secretary of State for the Home Department and the Commissioners of Sewers, since the 1st day of January 1853, in reference to the DRAINAGE of the METROPOLIS."

(*Sir Benjamin Hall.*)

Ordered, by The House of Commons, *to be Printed*, 11 *April* 1854.

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REPORT - - - - - - - - - - - - p. 3

CORRESPONDENCE - - - - - - - - - p. 14

COPIES of REPORTS and COMMUNICATIONS made by the Board of Health to the Secretary of State for the Home Department, in reference to the DRAINAGE of the METROPOLIS; together with COPIES of CORRESPONDENCE on the Subject, and of PLANS and ESTIMATES which have been forwarded to the Home Office by the Board of Health, with the Names of the ENGINEERS and SURVEYORS by whom such Plans and Estimates have been made: And of all CORRESPONDENCE that has passed between the Secretary of State for the Home Department and the Commissioners of Sewers, since the 1st day of January 1853, in reference to the DRAINAGE of the METROPOLIS.

REPORT.

Report, &c.

General Board of Health, Whitehall,
4 August 1853.

My Lord,

IN 1848, as members of the Metropolitan Sanitary Commission, appointed "for inquiring whether any, and what, special means may be requisite for the improvement of the health of the metropolis, with reference more particularly to the better house, street and land drainage, street cleansing and paving, the collection and removal of soil and refuse, and the better supply of water, more especially in the districts chiefly inhabited by the poorer classes of the population," we felt it our duty to join in a report, wherein it was set forth as conclusions, "That the works which the present District Commissioners of Sewers in the Metropolis execute and propose to execute are uncertain, erroneous, and defective in their general principles of construction, injurious in their action, and unduly expensive:"

"That after the authentic expositions which have been given of the principles of construction and management of improved works, the extension of sewers or drains accumulative of decomposing refuse, are acts of injury to the public health, and of waste of the public money."

At the instance of our colleagues and ourselves, a Consolidated Commission of Sewers for the Metropolis was issued, a general trigonometrical survey was executed, trial works conducted, and portions of improved works laid down. A further extension of trial works had been urged; but instead of this, the works for conducting them were taken up, and, as we are informed, all further investigation was abandoned. No account has been taken of the arrangements made for considering the under drainage of the low-lying and marshy districts bordering on the metropolis, or for the application of the sewage to agricultural production. Only piecemeal works, consisting of the larger mains, have been executed, and these on the old principles, without connexion with improved house drains, and without the proper distribution of charges.

We now deem it our duty to submit, that the objections urged against the works of the former Commissioners of Sewers apply with the like force against those proposed by the present Commissioners. We feel ourselves called upon to make this representation, particularly by the evidence given by the Consulting Engineers of the Commissioners before the Committee of the House of Commons on the Great London Drainage Bill.

Among the instances which evince the return on the part of the Commissioners to works constructed on principles condemned by recent Commissions of inquiry, we may advert to the Victoria-street sewer. As members of the first Consolidated Commission of Sewers, we protested against the construction of this sewer, or rather one proposed on a plan differing from it in no essential particular. For the time we succeeded in preventing the adoption of this plan; but since our withdrawal it has, with little variation, been re-introduced and executed.

From a Return laid before Parliament, it appears that the original estimate for this work was 13,854 *l.*; that the sum returned as expended is 28,000 *l.*, though we are informed that additional items should be included, increasing the money

Report, &c.

actually spent to 33,000 *l.*; that a portion of the sewer is in ruins; that the further sum of 15,000 *l.* is reported to be necessary to put it in what is deemed a proper condition; and that there are besides large outstanding claims for compensation on account of injury to property occasioned in the course of its execution.

We are prepared to show, from the results of trial works under the first Consolidation Commission, as well as from works actually executed, that the whole of Westminster proper, comprising nearly 400 acres, might be sewered, the pollution of the Thames avoided, and the sewage saved from that part of the metropolis, and pumped back to Fulham, for the disposal of the Sewage Manure Company, at an expense not exceeding 20,500 *l.*, for 23 miles of the requisite improved sewers, which may be termed self-cleansing, as distinguished from sewers of deposit; that the pumping works requisite for the delivery of the sewage, even as far as Putney, need not cost more than 6,500 *l.*, and that at the eventual cost of the single large sewer in question, of less than one mile in length, the house drainage of every house in Westminster proper might be completed, and every cesspool abolished, as have been effected in the Model Dwellings and the Cloisters.

We beg to refer, as exemplifying the relative expense to the ratepayers of improved works and of those constructed on the old principles, to the following statement made by Lord Morpeth, in a charge to a jury assembled to assess the rates:—

"The comparative cost of drainage works formerly constructed, and of those now proposed on spaces equally covered, would stand thus:—

"Per Lineal Mile:

	Annual Cost of Flushing, Cleansing and Repairs.	Average Rate of Principal and Interest per House, reckoning 320 Houses per Mile.
	£. s. d.	£. s. d.
Expense of works as formerly constructed, 5,000 *l.* - - - - - -	70 – –	1 2 2¾
	Annual Cost of Pumping and Maintenance.	
Expense of the system at present proposed, 1,000 *l.* - - - - - -	25 – –	– 5 –

"The proposed works costing less than one-fourth of the former system."

There were dangers peculiar to the Victoria-street sewer, arising from the unfavourable nature of the ground, of which warning was given at the time of its first proposal. Had these been avoided, the objectionable principle of its construction would have remained, and we submit that this objection is applicable to all sewers which accumulate deposit, and which require constant supply of water for their cleansing.

Yet the evidence given before the Committee of the House of Commons on the Great London Drainage Bill shows that the Engineers (*see* Answer 3459 in appended Evidence) consulted by the Metropolitan Sewers Commission still adhere to the principle of constructing sewers which accumulate deposit, and which require perpetual cleansing.

There have been now laid down in the metropolis upwards of 200 miles of public and private sewers, presumed to be on principles of improved construction. In general, the execution of these works has been entrusted to persons hostile to the improved system, who have not only shown no disposition to execute the details with due care, but in numerous instances have committed gross errors against express instructions. Taking the consequence of these errors at their full amount, however, it will be seen that still the expense incurred is trivial compared with the cost of the older sewers, which invariably accumulate deposit.

Impartial inquiry will further show that the representations which have been made that the new sewers also accumulate deposit are misleading, since the statement

ment of the circumstances under which the deposit has taken place is suppressed; namely, that in many of the pipe sewers in which deposit has been found, the pipes have been so laid as necessarily to occasion deposit, some of them, for example, having outlets into large sewers which are tide-locked, and which, consequently, block up the contents of the pipes, and others opening into large brick sewers, in which the deposit so rapidly accumulates as to get above the mouths of the pipes, and block them up. In other instances the pipes have been laid with scarcely any supply of water, and in others, as at Croydon, the required protection of the inlets expressly insisted on has been entirely omitted.

What proportion of the new works for which an immediate outlay of 567,000*l.* has been proposed would be sewers of deposit, we have no means of ascertaining.

We observe that it is stated by the present Superintending Engineer of the Commissioners (2454 appended Evidence), that another thousand miles of sewers would be required, the expense of which he states (2457) on a rough estimate to be Two millions of money. On the principle of construction adopted by this Engineer, namely, brick sewers of deposit, which may be entered by men for clearing them, we have no hesitation in declaring that to the extent to which such sewers are constructed, it would be expenditure in worse than waste. Apparently, in mitigation of such a system of construction, the Senior Consulting Engineer proposes, in answer to Question 3400, that every main sewer should be ventilated, as the up-cast shafts of coal mines are kept ventilated, by the action of fire, by means of 500 shafts or tall chimneys in various places. The expense of such shafts can scarcely be estimated at less than an additional half million, but the plan here proposed has been already tried, and has entirely failed. In the Report on the Supply of Water to the Metropolis it is stated, "The system of trapping having failed, other plans have been proposed, with a view to the ventilation of large sewers. The expedient of erecting chimney shafts with furnaces to draw out the foul gases, has been tried, for example, at Paris and Antwerp. Sewers have been partially ventilated by this means, but some of these gases being heavier than atmospheric air, have again descended and spread offensive odours over wide districts. At Antwerp it has been observed that, though in certain states of the weather no offensive odour could be perceived, yet whenever any fog hung over the city the diffusion of noxious gases was rendered disagreeably sensible. In London the steam jet has been tried, and, like the chimney shaft, it has been found partially to discharge the gases from sewers; but by frequent renewal of the air in contact with refuse in rapid decay, it is doubtful whether the result of this experiment was not a far more quick and copious diffusion of foul and dangerous gases, which, though drawn from the sewer, and discharged into the surrounding atmosphere, were not changed to a condition of salubrity. Upon the whole, these operations have not realised their premises.

"On a review of the whole evidence, it appears that there is no true remedy for the evils in question, but that which prevents the accumulation of refuse matter by providing for its immediate and rapid removal."

This contemplated expenditure of 2,000,000*l.*, or 2,500,000*l.*, would still leave untouched the main evil, the cesspools and the old house drains of deposit, which constitute two-thirds of the noxious evaporating surface by which the atmosphere of the metropolis is polluted, and the health of its population depressed. Until house drains are supplied and cesspools abolished, main drains are of little use, and the cost of their construction is comparatively wasted. Moreover, if only a small portion of the house sewerage, which they are intended to convey, be brought into them, the stream, instead of being deep and rapid, will be shallow and slow, and consequently there will be greater liability to deposit.

For this reason, in works carried on under the Public Health Act, the whole plans proceed upon the assumption that the house drains will form an integral part of the systematic drainage; and unless the main drains are laid out upon this assumption, the expenses may be augmented three or fourfold, and the chances of obstructions more than doubled.

From cases which have come before us as members of the General Board of Health, and from published statements, we feel it our duty to represent, that in as far as the Metropolitan Sewers Commissioners have adopted, as a general rule, that all houses shall be drained separately into the sewer, and in front of the street, instead of by a small branch sewer carried near to the back offices, and the sinks of premises, they have adopted a rule which is against experience even within their own

Report, &c.

districts; a rule which puts the owners or occupiers generally to threefold expense for what are always less efficient works.

In the absence of our colleague, Lord Shaftesbury, we would beg to submit these representations in our individual capacities as members of the Metropolitan Sanitary Commission, as well as members of the first Consolidated Commission of Sewers. In our official position it is our duty to examine the plans of works, for the execution of which applications are made for sanctions to borrow the requisite amount of money, and to take care that the works are of such a nature as will accomplish their object, and be of value to the ratepayers for the whole term for which it is intended that they should last. If in the performance of this duty we were called upon to sanction such works as the Commissioners appear from the published Evidence to contemplate, and for which they propose to borrow so large an amount of money, we could not take upon ourselves the responsibility of acceding to it.

On carefully considered plans of works for Westminster, and detailed estimates got out by trustworthy officers for other portions of the metropolis, a general estimate has been made for the improved drainage of the whole of the covered area, *de novo*, with sewers which would be free from deposit. On this estimate it appears that there would be required for the main intercepting lines 710,000 *l.*, or at present prices say 1,000,000 *l.* sterling, to secure the same object, for which it is proposed by the present Commission to spend about 3,000,000 *l.*; namely, the preservation of the Thames from pollution.

Estimating the whole of the subsidiary drainage at the same rate as for the Westminster district, and the house drainage at a higher rate than that for which the work has been carried out in various districts, the whole cost of the public and private works would not much exceed this sum of 3,000,000 *l.*; whereas one of the two Consulting Engineers is understood to say that the expenditure of 10,000,000 *l.* may be expected before the public works alone carried out on the principle adopted by the Sewers Commission will be complete.

By the main works of sewerage the whole of the house sullage would be diverted from the Thames; but this is a measure which one of the Consulting Engineers treated as inexpedient or impracticable. He appeared to regard as a permanent measure a work which we proposed as a temporary measure; namely, the covering up the outfalls of the sewers to below low-water mark. This the Engineers (*vide* App. p. 9.) then reported against as not worth the expense, for the intervening period before which it was at that time confidently expected that the complete clearance of the river from all house sullage, from all but extraordinary storm water, would be effected.

Until the recent evidence before the Committee on the Great London Drainage Bill, it was understood that the plan for a line of intercepting sewer, with the view of preventing the pollution of the Thames, had been agreed upon at an outlay for the north side of the river of 1,250,000 *l.* If there had appeared to be any chance of the money being obtained for that object, we should have felt it our duty to submit engineering evidence, that the object contemplated by that work might be better obtained by another plan for half a million of money, and including both sides of the river for 710,000 *l.*, as above stated, instead of 1,500,000 *l.*, as proposed by the Commissioners.

We are fully aware that the works objected to have the support of eminent general engineering authority; but so had the main works of the superseded Commissions, which were condemned by the Engineers of the Health of Towns Commission, as well as by all the scientific witnesses examined under the Metropolitan Sanitary Commission.

There is now sufficient experience of properly executed works to enable us to state, that general relief might be afforded, and that even to the worst-conditioned districts of the metropolis, similar to the relief which has been given in the instances annexed.

We have experience that the most important portion of relief is in house drainage works, and that where even self-cleansing sewers are constructed in the ordinary manner, but without house drainage, and without the abolition of cesspools, only a small reduction of mortality can be traced to the works; but where cesspools within houses and drains of deposit are removed, and self-cleansing apparatus substituted, very large reductions of disease are early apparent, although the general sewerage works remain without material improvement.

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In further illustration, we may mention that Woolwich, a suburban portion of the metropolis, beyond the jurisdiction of the Metropolitan Commission of Sewers, has recently been placed under the Public Health Act; that a sanction has been given to the Local Board for the construction of public main and branch sewers, and that contracts have been taken for the execution of this system of works for the sum of 16,500 *l.*; that is, at the rate of 4*d.* in the pound, or an average of $1\frac{1}{4}$ *d.* per house per week; so that a labourer's tenement, valued at 6*l.* 10*s.* per annum, will pay only $\frac{1}{2}$ *d.* per week for a system of public drainage which removes all foul matters from near the premises. For the abolition of cesspools, and the provision of a water-closet apparatus, an additional rate of about 1 *d.* only will be required; the whole being less than the expense of cleansing cesspools alone. We believe that the complete house and main drainage of the metropolis might now be effected at an average of 2 *d.* per house per week.

We beg to observe that, in relation to the new Consolidated Commission, we objected to their being entrusted with the distribution of charges over long periods of time, without the provision of competent and responsible examination, to ensure that the works should be of future benefit equal to the future charge. This, which is now a settled principle of jurisprudence, is specially recognised by the 3d & 4th of Her present Majesty, containing provisions for facilitating the drainage of settled estates by the statutory provisions regulating the alteration of corporation property, and by the Public Health Act, which declares, in relation to works executed under that Act, that, however a majority of local representatives may spend their own money without control (that is, by immediate outlays), they may not so spend the money of reversioners and others, including minorities, but must obtain the sanction of the General Board of Health before they mortgage future rates.

The expense and failure of such works as the Victoria-street sewer have been often attributed by rate-payers and the public, who are incorrectly informed as to the real facts, to a failure of new works proposed for sanitary improvement; and this impression, concurring with the failure resulting from the grossly defective execution of improved plans, has operated for the time most unfavourably on the progress of sanitary improvement in other towns.

Without denying that there may be among the works proposed by the Commissioners some which would afford immediate and very important relief, and without contesting the comparative merits of particular lines of works, we beg, in conclusion, to state that our main objections are—

1. To the construction even of proper sewers without their adaptation to an improved system of house drains.
2. To the provision of sewers and house drains, which do not include the total abolition of all cesspools.
3. To the laying down separate drainage for each house in all cases, as opposed to the plan of back drainage, wheresoever practicable; that is to say, in the great majority of instances; a course of proceeding which appears to us to be so erroneous in principle, and so productive of useless expenditure, as to prove that the work cannot be under competent and safe direction.
4. To the recognition of the principle that sewers must necessarily accumulate deposit, by requiring that they should all be constructed large enough for men to enter to cleanse them.

We have, &c.

To the Right hon.
Viscount Palmerston, M. P.,
&c. &c. &c.

(signed) *Edwin Chadwick.*
T. Southwood Smith.

EXTRACTS from EVIDENCE referred to in preceding Letter.

Mr. *J. W. Bazalgette.*

2451. GIVE us the number of miles of sewers that are necessary for the drainage?—There are near 1,000 miles of sewers urgently required in this metropolis within the rated area.

2454. And another thousand miles required?—That thousand miles includes the re-construction of some sewers that are now so defective that they need re-constructing; for instance, under Portman-square, Baker-street, and some such places, the sewers require re-construction; they are worn out; I name them among many others I could enumerate.

Report, &c.

2457. Are your existing funds sufficient to enable you to make these additional necessary sewers?—When I tell you that a rough estimate lately made of the cost was about 2,000,000 *l.*, you will see that it is not.

2475. *Committee.*] Do you consider intercepting drains essential for a good system of drainage for the metropolis?—No, certainly not; I think it has nothing to do with the draining of the metropolis.

2476. Mr. Forster did?—No.

2477. Not when he wrote this Report?—I believe not.

2478. What was his object?—Interception of the sewage from the river.

R. Stephenson, Esq., M.P.

3266. Now, we are told by the City Engineer that during the whole of his experience, year by year, the banks of the Thames are becoming less and less offensive, and the accumulation less; is that in accordance with your own belief?—My impression is so; I think with the exception of some cases where the sewage has been rather concentrated in hot weather, I have sometimes felt it offensive at spots. There is one near Hungerford, to which my attention was called, and there is one higher up; but taking the shores of the river generally, looking back for, say 15 years, my impression is, that they are rather better than worse.

3271. What is your opinion of the effect of carrying out the present sewers to the low-water mark or the point below low-water mark, not intercepting the sewage water?—I believe it will remove, in a great measure, all the complaints that have been made.

3272. You agree entirely with the City Engineer in thinking that it ought to be done, if there was not some scheme of this sort?—Yes; but that ought to be done if there is a scheme of this sort.

3273. Because a large portion of water must find its way by the present communication with the Thames, even if those intercepting drains were established?—No doubt, in times of rain.

3274. What would practically be the great evil if that were done, of which the community would complain, if all the sewers were carried out to the low-water mark; what would be the great practical grievance of which London would have to complain from the absence of intercepting drains?—I do not believe, myself, the inconvenience would be very great.

Sir *W. Cubitt.*

3397. In your opinion, as an engineer, would the plan of the Promoters of the Bill provide for the better drainage of the metropolis?—It does not provide for the drainage of the metropolis properly so called at all, that I am aware of.

3398. Does it do any more, supposing it successful, than prevent a certain portion of the sewage of the metropolis passing into the Thames?—Yes, it does that.

3399. Does it do more?—I do not know that it does; as regards its physical effect, I think not any more. I do not think it, myself, even necessary to do that, if proper means were taken to make the Thames, as it ought to be, a proper receptacle and sewer to take the filth of the metropolis and the surrounding districts. If the Thames were made, as it might be made, a much better outfall than it is now, for taking away the land waters, and with the land waters, the sewage waters; if that were improved, as it might and ought to be, so as to have a deeper channel at all times, and no dry shores, and the water for culinary purposes, as is now being done, all taken from the Thames above the tideway, in my opinion there would be no necessity for the public disturbing themselves about the Thames River. They would not make it altogether free from filth; do what they could, they could not make it half free; and therefore, if all necessity for taking away the remaining part, if that filth was done away with, the expense need not be incurred. Moreover, London might be so drained, as it wants to be properly drained, by a means which will take the whole of the sewage down continually and deliver it below low-water mark, at all tides and at all times; it will then be no nuisance to the river or to the people. I do not believe that anybody ever smelt the Thames; they have smelt the drying mud and the stench from 50 sewers opening into it, with wide open mouths, as I have, many a time; but the Thames itself I do not think need be at all a nuisance. I will show why, if I can.

3400. You spoke of the open mouths of the sewers; would you carry the sewage further out by pipes?—I would carry large sewer-pipes of cast-iron, and pipes that would bend to the shape of the bottom of the river, down close on the bottom, so as to take the shape of the bottom, so that their mouths should be at all times under low-water mark. Then, if every main sewer was ventilated, as ought to be done, there would be enough draught of foul air going out at the top of the town in 500 places, more or less, according to circumstances, ventilated as the up-cast shafts of coal mines are, and the sewers would be sweet to go into, and kept ventilated by the fire. Then there would be a delivery of all the sewage into or below the surface of the Thames at all times, and the stench that now keeps coming up in our streets from the sewers would be completely done away with: instead of the foul air coming out of the gratings, it would go into the gratings; that is a possibility also.

3414. With regard to what you have said of the low level of the south side, or the west level of the north side, do you think any mischief would arise to the metropolis if all the sewage water was to go into the Thames?—I would have it all go into the Thames.

3429. All these things arose from the question called the "Dolphin question," when people

people used to drink the water of the Thames?—There was a place called the Dolphin (this was 20 or 30 years ago), which was used for pumping up the water for the purposes of the metropolis: the place was called the Dolphin, and that Dolphin was placed opposite to the mouth of the King's Scholars Pond sewer; it was not the purest and best place to put a section-pipe in to pump water for the metropolis. There was a great noise made about it; a great many meetings, and great disturbance from that time to this; though the waters for the culinary purposes of the inhabitants of the whole of London are taken entirely away from the tideway of the Thames now; I am not sure of every one, but I think they are all now: bargains were made for it last year. There is nothing to disturb the taste of the inhabitants, or the smell of the inhabitants now, for the water is taken from Thames Ditton, above the reach of the tide.

3430. But you were referring to the period 25 years ago?—I am a bad hand at dates; it may be that.

3431. I lived at the Dolphin at that time myself; I had some gentlemen come as a deputation to me, to ask me to devise some waterworks: one of the gentlemen asked me if I would let my servant bring him a glass of water; the man brought up a glass of water; this gentleman took the water, and looked at it, and tasted it; and he said, "This is something like water; if we could get water like this I should be most happy." They came to consult me about water.

3432. Was that Dolphin water?—You will hear: "You like it, do you?" said I. "I think it is the brightest, clearest water I ever saw." I said, "That is taken up at the Dolphin;" and so it was.

343 Would you have kept the Dolphin there?—No; but the water, if it was properly managed, and cleanly and nicely filtered, will come out very bright water; that is all I mean. I never approved of the Dolphin water.

3459. It has been stated here that the sewers that have been constructed are of too large size; do you consider that the sewers that are constructed for the City, or the sewers constructed by the Metropolitan Commissioners of Sewers, are too large?—I never knew one too large yet, because I begin with this, that every sewer under a main street or public carriage-way ought to be sufficiently large for a man to go in without any discomfort, to rake it out, and repair it: they cannot be less than three feet high, even in small roads or streets, to enable him to do that; five feet, or five feet three, and three feet six wide, is a very good sewer. Then there is a shape shown in that book which always has a narrow bottom (let the sewer be as large as it may) where the water runs.

REPORT (printed for the use of the Metropolitan Commissioners of Sewers only, 11th November 1848), as to covering over the Outfalls of the Sewers on the Banks of the Thames.

The Surveyors having been directed to report "as to the most desirable works for covering in the outfalls of the sewers at the River Thames," beg to lay before the Commissioners the following list of outfalls from the sewerage of the Westminster Division, with the respective distances from low-water mark, and the size of pipe in each case which they consider proper for the conveyance of the common run of foul water.

Should the Commissioners decide upon covering in any or all the outfalls to low-water mark, the Surveyors would recommend that iron pipes should be used for that purpose.

At the same time the Surveyors respectfully beg to state, that as, in their opinion (long since expressed), no foul sewage should be allowed to enter the River Thames in or near the Metropolis; and as, when the general survey is completed, lines of sewers may be laid out to meet their views on this subject; they cannot recommend the expenditure of money to cover in the present outfalls, which they hope soon to see done away with altogether as to their use for foul drainage.

(signed) *Henry Austin.*
John Roe.
John Phillips.

The Surveyors would add, that the estimated cost for covering in the outfalls named in the Westminster Commission is 13,000 *l.*, and that the covering in the outfalls of the sewers in the Surrey and Kent and Tower Hamlets Divisions would cost a much greater sum.

In reference to the effluvia at the outfalls of sewers the Surveyors beg to state, that where the sewers are kept flushed regularly with water no effluvium of a character prejudicial to health is emitted. In sewers where deposit has been allowed to accumulate, trapping the gully-holes has had the effect of increasing the amount of effluvia of a dangerous character discharged at the outfalls.

Effect of Sanitary Improvement on an Epidemic Locality in *Lambeth.*

In the Report of Dr. Sutherland on the sanitary condition of the epidemic districts of Lambeth, recently inspected with reference to the threatened visitation of epidemic cholera, particular attention is directed to one epidemic locality in which a remarkable improvement has been effected by the execution of suitable works of house drainage and water supply: the spot in question is Lambeth-square, which is described as having been, a short time ago, "a perfect hot-bed of zymotic disease." In the beginning of the present year the attention of the General Board of Health was called to this locality by a memorial from the owner, representing that the square consisted of 40 houses, which for three years past had suffered most severely from typhus fever; that 400 *l.* per annum had been spent in repairs,

Report, &c.

drainage and cleansing without effect, and that at that time the disease had broken out again.

In compliance with the request of this memorial, a house-to-house inspection was made, with a view to ascertain the condition of each house; from which it appeared, that in a population of 434 souls, there had been, in one year, 80 attacks of zymotic and other diseases = 18·4 per cent., or one in every $5\frac{4}{10}$ of the population; and 24 deaths = 5·5 per cent., or one death in every 18 living; and that all the deaths, with one exception, were under nine years of age.

Destitution, which is so often and so erroneously adduced as a predominating cause of zymotic disease, and especially of typhus, could not have operated in this case, for the inhabitants belong to the better class of workpeople, in the receipt of high wages, chiefly engineers, employed by Messrs. Maudsley & Field, and stonemasons engaged on the Houses of Parliament. The square consists of a number of well-built eight-roomed houses at about 26*l.* a year rent: there is a large garden in the centre of the square, which is shut off from the neighbouring street by gates, and is well attended to.

The result of the inquiry was the establishment of evidence to prove that the inhabitants of these houses were poisoned by breathing a pestilential atmosphere, caused by emanations arising from open privies and badly-constructed drains.

The houses were drained in the following manner: generally to five houses there was one brick flat-bottomed drain, with a curved head, passing under the middle house; the drains were untrapped, and an open privy was placed over the mouth of each drain, which had to be opened occasionally when the drain became obstructed, and the matter found in it taken out and removed; sometimes this matter was thrown into the ash-pit or buried in the yard. In every house where this arrangement existed, the people complained of the odour as something quite frightful.

A large proportion of the houses suffered severely from zymotic disease, but others escaped; making good the observation, that such diseases do not invariably attack unhealthy houses, but that unhealthy houses are always those attacked.

Some of the houses, as Nos. 26, 27, 28 and 29 had neither smell nor disease, and they were supplied with water-closets: and, as if the exception should prove the rule, No. 30 had a water-closet, but two children had died of scarlet fever; they lived in the kitchen, in front of which was an untrapped gulley-hole, to which the medical attendant traced the disease.

It appears that the total cost of this drainage, which had caused so large a sacrifice of human life, had been, including repairs, about 1,250*l.* in 20 years, or about 1*l.* 15*s.* 10¼*d.* per house, per annum, or 8¼*d.* per week. This was the owner's part of the cost. The occupiers, in their last year of sickness, contributed 80 attacks of typhus fever, scarlet fever, small-pox, &c., and 24 deaths, which, when reduced to money, at the very moderate rate of 15*s.* per case for medical attendance, and 4*l.* for each funeral, would make 160*l.*

The cost of abolishing this noxious system of cesspools, and substituting a complete arrangement of pipe-drains and water-closets for 35 houses, was less than 200*l.*; which sum, if distributed over a period of 30 years, would entail an expenditure of 7*s.* 7¾*d.* per house, per annum, about 1¾*d.* per week.

It was stated by the person who attends to the estate, that the closets are drained with 4-inch pipes; that the back drains are 6 inches, and that the mains are 9 inches in diameter.

The people bore general and earnest testimony to the great improvement in their health and comfort that has been effected by the new drainage: they state, that the drains have acted well; that there has been no stoppage, no smell, and no disease. The course of typhus and its kindred diseases has been promptly and entirely arrested. Up to the present time this experiment has been attended with complete success.

I witnessed a successful method of draining flood ditches in operation near the Clapham-road. An open ditch or natural watercourse which ran alongside a garden and past the end of a shop and house was a source of great nuisance to the neighbourhood, and the tenant of the house was always subject to diarrhœa, and finally died. An 18-inch pipe drain, sufficiently large to carry away the ordinary water-flow, has been laid in the ditch, and covered up, leaving space above the flood, which happens only a few times a year. This contrivance appears to answer quite well. When I went along it the ditch was dry, and the pipe-drain running about half full. In a sanitary point of view it has also answered its purpose, for the nuisance has been abolished, and the neighbouring houses are now comparatively healthy. The whole cost of this improvement was about 7*s.* a yard for drain-pipes and works; while the cost of a 4-feet brick sewer to carry away a few floods every year, and to become a cesspool during the intervals, as is common in all the instances where simple covering over is adopted, would have been from 45*s.* to 50*s.* a yard. (*See* Minutes on the Drainage of the Sites and Towns.)

EXTRACT from Dr. *Sutherland*'s Report on *Westminster*, showing the Results of efficient Drainage in the Cloisters and Precincts of Westminster Abbey.

A STRIKING example of the beneficial results of combined sanitary works of drainage and water supply is afforded by the improvements which have been effected in the Cloisters and Precinct of Westminster Abbey. It appears from the Third Report of the Metropolitan Sanitary Commissioners, that in the month of April 1848 a severe attack of fever took place amongst the scholars and residents; 14 of the boys were attacked, and two died. Among the other inhabitants, including servants, there were 22 attacked, and one died of fever, making in all 36 attacks and three deaths.

It

It appears from the evidence laid before the Metropolitan Sanitary Commission, that the fever was of the type usually observed to arise from local causes, and that cases of a similar character had occurred within the Precinct during a number of previous years.

On two separate occasions, immediately before the outbreak of the fever of 1848, a strong stench was experienced in the school. The first was thus described by the Rev. S. T. Rigaud, the second master:—"There was a violent stench in the school in the second week in March,—a remarkable stench, so strong that it affected myself in merely passing through it in going up to the school-room; it was more by the school-door than in the school. I was obliged to leave the school one morning for a few minutes, being very much inclined to vomit. There is a vestibule through which we enter into the school; there the stench was the strongest, but it penetrated about half way up the school itself. Every boy must necessarily have passed through that region of stench in getting to his place. It affected Mr. Weare, the under master, in a very similar manner to what it did myself, producing a strong metallic taste in his mouth."

The second occurred about the 12th of April. Mr. Weare, whose illness seems to have commenced about this time, thus speaks regarding it: "My own impression is, that the smell occurred about a week or nine days before Good Friday, but I cannot speak positively. Several of the boys in the school also think that it occurred about a week or fortnight before Easter. One boy is positive that the same smell of dead rats occurred on two occasions; the last and most offensive, he thinks, about eight or ten days before Easter; the first and less powerful smell, though of the same kind, several weeks before Easter. It seemed to me as if some rats had congregated together, and had died in great numbers under the floor of the school near the door. In consequence, I sent to the clerk of the works to request that the floor should be taken up, and search made for the cause of the smell. The school was free from smell at eight o'clock on the morning when the stench occurred; at ten o'clock we all perceived the smell, and it prevailed, I think, all that day and a portion of the next."

It appears, also, that disagreeable smells were perceived in other places besides the school. Mr. White Cooper, the surgeon, who attended the family of the Dean of Westminster, says: "The family had been complaining of an unpleasant smell, as I ascertained, for some days previous to the attack. They stated that there had been a very unpleasant smell in the house, and certainly I can bear testimony to it myself as being a peculiarly disagreeable odour."

Mr. Lovick made a house-to-house inquiry among the residents, and received from them answers to the following effect: "Occasionally we have very offensive smells." "Sometimes very dreadful." "More than ordinary at changes of the weather." "Mostly after rain and of a dull dark day, or after very wet or very dry weather, and generally at every change of the weather."

The circumstances attending this outbreak of fever led to a minute examination of the sewers and drains running under the Cloisters, the precise condition of which no one at the time appears to have been at all aware of. The locality where the fever had occurred presented, in an intense degree, that class of destructive evils arising from erroneous works of drainage, which usually constitute so serious a cause of epidemic disease in many parts of the metropolis. The subsoil was honeycombed with cesspools, and tunnelled underneath by enormous cavernous sewers of irregular forms and dimensions, having no regard to the volume of fluid they were intended to carry away; and, like so many similar works in the metropolis, they had become extended cesspools, filled to a depth of several feet with the putrescent deposit of ages. The odours in the houses were distinctly traced to these enormous sewers, the evaporating surface of which was estimated by Mr. Lovick at about 2,000 square feet.

In attempting to enter the sewers, it is stated that the workmen, "after several attempts to examine the sewer, were unable to proceed with the investigation;" that "the soil rose to the top of their long water-boots;" that "the contents of the sewer could not possibly flow into the public sewer;" that "they were obliged to get back, otherwise they would have got into the deep;" that "beyond a certain part the sewer was so foul that he could not get in at all;" and that the stench was so frightful, "that a person who was not used to it could not have gone into it at all."

It appears that the foul air escaping into the Cloisters and Precinct, from the various apertures connected with these sewers, could not have been less than 54,000 cubic feet per hour, a quantity stated to have been sufficient to have filled the school-room in three hours, the houses in 16 hours, and the Abbey itself in about 93 hours.

The Commissioners arrived at the following conclusions as to the remedies required: "We recommend that the whole of the branch as well as the main drainage under and about the school, and in the Cloisters, be immediately taken up, and a system of tubular drainage, with adequate and regulated supplies of water, substituted; that the cesspools and privies be removed, and the water-closet apparatus laid down in their stead; and that, by means of efficient traps, all communication with the adjoining sewers be prevented as far as may be practicable."

In conformity with this recommendation, a plan for combined works of water supply and tubular drainage was drawn up and executed in October 1848.

I called at the school, and saw Mr. Liddle, the head master, and Mr. Ryde, clerk of the works, who stated that the new drainage had answered perfectly well. Mr. Ryde informed me that there had been only one stoppage, which had been occasioned by the sinking of the bed on which the pipes were laid, under one of the joints, and from the workmen having neglected to remove the ring of cement inside the joint. The defect was speedily remedied, and since that time there has been no further obstruction.

Report, &c.

At first, part of the drains used to be flushed, but for the last two years, Mr. Ryde stated that this operation had not been performed, and that the usual water-flow had been found sufficient to keep them clear of deposit.

Before the change in the system of drainage, Mr. Ryde said that there were "constant smells all over the place," but that there had been none since, and that the locality escaped without any illness during the last cholera, while the disease was ravaging the neighbourhood.

Mr. Liddle informed me that the drainage arrangements in his own house acted satisfactorily and without smell, and that the school has been healthy since the execution of the improvements, there having been no recurrence of fever cases amongst the scholars.

I have likewise communicated with Dr. Fincham, the medical attendant, who states that "cases of measles, chicken-pox, mumps, and hooping-cough have occurred from time to time, but that there have been no cases either of scarlet or continued fever, and none of small-pox."

It would thus appear, that while those severer forms of zymotic disease, connected with intense local causes, have disappeared since the execution of the sanitary works underneath and within the dwellings which were specially intended for the removal of those local causes, the general influence of the unimproved neighbourhood has continued to manifest itself in the occasional occurrence of the milder forms of infantile diseases.

EXTRACTS, showing the Results of Residence in IMPROVED DWELLINGS.

IN the year 1850, the comparative mortality of the residents in the Metropolitan Buildings, both adults and infants, was so small, that it was generally concluded that the result was accidental.

In the year 1851, this comparative low rate of mortality continued, though the actual mortality was higher than in the former year.

In the subsequent year the mortality again became nearly the same as in 1850.

The following are the exact results :—

In 1850, the total population in the Metropolitan Buildings, Old Pancras-road, was 560, and the deaths were seven, being at the rate of 12½ in 1,000 of the living.

In 1851, the total population was 600, and the deaths were nine, being at the rate of 15 in the 1,000.

In 1852, the total population was 680, and the deaths were nine, being at the rate of 13 and a fraction in the 1,000. The average mortality of the three years in these Buildings has been 13·6 per 1,000.

But taking together the whole of the establishments of the association, which had now come into full occupancy, the total population for the year ending March 1853 amounted to 1,343. Out of this number there were, during that year, 10 deaths, being at the rate of seven and a fraction in the 1,000.

If this mortality is compared with the mortality of the metropolis generally, and with the mortality of one of its worst districts, the following results are obtained :

The deaths in the whole of the metropolis, during the same year (1852), reached the proportion of 22 and a fraction in the 1,000 ; consequently, the total mortality in London generally, taking together all classes, rich and poor, was proportionally more than three times greater than the mortality in these establishments.

On a comparison of the infant mortality in these dwellings with that of the metropolis generally, the results present a still more striking contrast. Of the total population in the establishments of the Association (1,343), 490 were children under 10 years of age. Among these there occurred five deaths, being in the proportion of 10 in the 1,000. In the same year the infant mortality in the whole of London reached the rate of 46 in the 1,000 ; consequently, the infant mortality in the establishments of the Association has been little more than one-fifth of that in London generally.

This low rate of mortality, the comparative absence of sickness, and the genera state of well-being implied in the two former conditions, will appear the more remarkable when compared with the mortality in one of the worst districts of the metropolis.

In the Notting Hill division of Kensington parish, there is a place called the "Potteries," which is wholly destitute of the sanitary provisions secured to the improved dwellings. Until recently it had no drainage, and even now there is little that is effectual. It has no supply of water, no means for the removal of filth, and the houses are dirty, damp and miserable beyond description or belief.

According to the census of 1851, the population of the Potteries was 1,263 ; and the number of children at that time living under 10 years of age was 384. As the population of this place is not migratory, but quite stationary, it may be assumed to be pretty much the same in 1853 as it was in 1851. At all events, it may be considered as sufficiently so, to afford the means of comparing its mortality for that year with the mortality of the Metropolitan Buildings.

From the returns of the Registrar-general, it appears that during the year ending the 31st March 1853, the total deaths in the Potteries, from all causes, amounted to 51. In the Metropolitan Buildings the deaths were 10 ; so that with a smaller population (80 less), the deaths were 41 in excess. In the Potteries, the deaths from all causes, under 10 years of age, were 42. In the Metropolitan Buildings they were five, being an excess of infant mortality in the Potteries of 37. In the Potteries, the proportion of deaths per cent. to the population

population was 4·03, or 40 in the 1,000. In the Metropolitan Buildings it was ·74, or seven in the 1,000, being an excess in the Potteries of 33 in the 1,000. In the Potteries, the proportion of deaths per cent. under 10 years of age to the population under 10 years of age was 10·9, or 109 in the 1,000. In the Metropolitan Buildings it was 1·0, or 10 in the 1,000, being an excess in the Potteries of 99 in the 1,000. In the Potteries, the proportion per cent. of deaths from zymotic diseases, under 10 years of age, to the population, was 5·2, or 52 in the 1,000. In the Metropolitan Buildings it was ·82, or eight in the 1,000, being an excess in the Potteries of 44 in the 1,000.

These results are presented under one view in the following Tables :—

COMPARATIVE VITAL STATISTICS.

No. I.—With respect to PERSONS of all Ages.

LOCALITIES COMPARED.	Population.	Mortality.	Proportion of Deaths to 1,000 Living.	
			Actual Proportion.	Number in Excess of Metropolitan Buildings.
Metropolitan Buildings - - -	1,343	10	7	—
Whole of London - - - -	2,420,619	54,213	22	15
Potteries, Kensington - - -	1,263	51	40	33

No. II.—With respect to CHILDREN under Ten Years of Age.

LOCALITIES COMPARED.	Population.	Mortality.		Proportion of Deaths to 1,000 Living.			
				All Causes.		Zymotic Diseases.	
		All Causes.	Zymotic Diseases.	Actual Proportion.	Number in Excess of Metropolitan Buildings.	Actual Proportion.	Number in Excess of Metropolitan Buildings.
Metropolitan Buildings -	490	5	4	10	- -	8	—
Whole of London - -	547,806	24,661	8,933	46	36	16	8
Potteries, Kensington -	384	42	20	109	99	52	44

It will be seen from Table No. I. that the deaths from all causes in the whole of London were, in proportion to the population, three times more than in the Metropolitan Buildings, and in the Potteries nearly six times more.

From Table No. II. it appears that the deaths from all causes among children under 10 years of age were, in proportion to the population in London generally, 4½ times more numerous, and in the Potteries 10 times more numerous than in the Metropolitan Buildings; while the deaths from zymotic disease among these children were, in London generally, twice, and in the Potteries 5½ times as many as in the Metropolitan Buildings.

If the deaths in the whole of the metropolis had been at the same rate as in the Potteries, there would have died, in London, in that year 94,950 persons, whereas the actual deaths were 54,213; that is, there would have been a loss of upwards of 40,000 lives; and if the whole of the metropolis had been as healthy as the Metropolitan Buildings, Old Pancras-road, on an average of the three years, there would have been an annual saving of about 23,000 lives.

Correspondence, &c.

CORRESPONDENCE.

No. 1.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M. P.

Metropolitan Sewers Office, 1, Greek-street, Soho,
My Lord, 5 January 1853.

On the part of the Metropolitan Commissioners of Sewers, and at their request, I have the honour, as their chairman, to solicit your Lordship's attention to the defective state of the law regulating the powers of the Commissioners, and especially with reference to their powers of borrowing money.

The Metropolitan Sewers Act of 1848 (11 & 12 Vict., c. 112), which first established one general Commission for the metropolis, limited the amount of rates which the Commissioners were empowered to levy to 1 *s.* in the pound; a subsequent Act reduced the amount to 3 *d.*, and an Act of last Session raised it to 6 *d.*, at which amount it now stands; a sixpenny rate produces an income of about 200,000 *l.*

This income, after allowing for the annual charges of maintaining and keeping in order the existing sewers, is quite insufficient to meet the present requirements of the metropolis for the execution of new works which its health and comfort imperatively demand, and for which the public are daily becoming more urgent. Large sums are required to be raised by way of loan. The Act of 1848 contemplated such a mode; it contains provisions for spreading the cost of new works over a period of 30 years, and it professes to supply the necessary means by enabling the Commissioners to borrow, without limit, on the security of the rates.

These powers, however, owing to the manner in which they were framed, have proved nearly inoperative, all attempts to raise money under them having been unsuccessful, except to a comparatively trifling amount. The Commissioners, in consequence, find themselves placed in a position both painful and embarrassing; they are frequently compelled to avow their inability to afford any relief in cases where disease and death prevail to a fearful extent, clearly attributable to want of drainage in localities where nothing less than a large outlay will do any good. In other instances, they have been obliged to sanction (because less costly) modes of drainage, by no means free from objection, and in the end more expensive, rather than leave the suffering localities for the present altogether destitute of drainage.

The above circumstances were strongly represented by the Commissioners to the late as well as to the preceding Administration, and in both instances expectations were held out of a speedy amendment of the law. The Commissioners now feel it to be their duty respectfully to urge the same matter upon your Lordship, in the hope that it may receive the early attention of Her Majesty's Government; and they do so with the more confidence as they believe that a few simple and easy alterations in the Act of 1848 would remedy the defects of its Borrowing Clauses, and remove the principal impediment to the successful working of the Commission.

There are other defects in the Sewers Acts, not unimportant, but of a less urgent character, as to which the Commissioners, if encouraged by your Lordship, would desire to offer suggestions, with a view to their amendment also; but at present they do not think it so necessary to advert to them in detail.

I may be allowed to point out to your Lordship, that inasmuch as the Act of last Session (15 & 16 Vict, c. 64), continuing the powers of this Commission, will expire on the 7th of August next, legislation upon the subject of the Sewers Commission during the present Session of Parliament will become indispensable.

I have, &c.
(signed) *Richard Jebb.*

No. 2.

No. 2.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Whitehall, 15 January 1853.

Mr. Waddington presents his compliments to Mr. Jebb, and is directed by Viscount Palmerston to request that Mr. Jebb will call on his Lordship at the Home Office on Tuesday next, at four o'clock.

No. 3.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

1, Greek-street, Soho, 17 January 1853.

Mr. Richard Jebb presents his compliments to Mr. Waddington, and will have the honour of waiting upon Lord Palmerston at the time appointed by his Lordship, namely, four o'clock on Tuesday, the 18th.

No. 4.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 25 January 1853.

Viscount Palmerston having understood from you, that the Metropolitan Commissioners of Sewers have a plan for some great lines of sewers, I am to request that you will furnish his Lordship with a written statement and explanation of such plan, with a description of the lines proposed to be taken, and an estimate of the expense to be incurred.

I am, &c.
(signed) *H. Waddington.*

No. 5.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 26 January 1853.

In reply to your letter of yesterday, desiring me to furnish Viscount Palmerston with certain particulars of the great lines of drainage proposed to be taken by the Metropolitan Commissioners of Sewers, I have the honour to enclose, for his Lordship's information, printed copies of two Reports prepared by the late Mr. Forster, formerly Engineer to the Commission, and embodying a scheme for the main drainage of the northern and southern portions, respectively, of the metropolis. It will be seen that the estimate for the northern drainage amounts to 1,080,000 *l.*, and for the southern to 241,297 *l.*, making a total of 1,321,297 *l.*, exclusive of the sums required for the purchase of land and houses, which may be needed for the site of the pumping engine-house, and compensation for certain portions of the lines of sewer, as to which no estimate has been made.

The scheme proposed in these Reports was adopted by the late Commissioners, our predecessors in office; and the present Commissioners are now engaged in considering it, and are about to submit it to their Consulting Engineers, Sir W. Cubitt and Mr. Stephenson, for the purpose of obtaining their judgment upon it, and of determining whether it ought to be carried out in the form proposed, or with any and what modifications.

The dimensions of the sewers in sectional area, as prepared by Mr. Forster, vary from five to 10½ feet diameter, or equivalent areas in egg-shaped form.

I have only to add, that I shall be ready to afford his Lordship any further information upon the subject which it may be in my power to render.

I am, &c.
(signed) *Richard Jebb.*

Correspondence, &c.

Enclosure No. 1, in No. 5.

The ENGINEER'S REPORT on the Drainage of the Districts North of the River Thames.

Printed pursuant to the Order of Court, 31st January 1851.

To the Honourable the Commissioners of Metropolitan Sewers.

My Lord and Gentlemen, London, 30 January 1851.

I HAVE the honour, in accordance with instructions received from you on the subject of the drainage of the northern part of the metropolis (which instructions are transcribed below), to lay before you my Report.

Copy of Instructions.

"Resolved, That in effecting the drainage of this portion (northern) of the metropolis, it is expedient—

"To keep the river Thames, within the metropolitan districts, free from sewage at all times of the tide.

"To provide an escape, by means of intercepting drains, for so much of the sewage of the north side of the Thames as admits of being so carried off.

To raise all other sewage by artificial means, so as to deliver into a main channel for removal, in accordance with the foregoing resolution.

"So to construct the intercepting sewers as to secure the largest amount of effective drainage, without having recourse to artificial means.

"Resolved, That the fall of the main intercepting sewer from Albion-street, Uxbridge-road, into the river, be in no place less than four feet per mile.

"Resolved, That Mr. Forster be directed to prepare plans and estimates, according to the foregoing resolutions, carrying the whole of the sewage to Gallion's Reach, at the same time considering the alternative, in the event of accident to such machinery as may be necessarily employed to carry the same into or near the river Lea.

"Resolved, That the engineer be instructed to prepare, by Friday next, the 31st instant, a full and detailed report, with plans and sections, in accordance with the resolutions of the Committee, on the drainage of the whole of the metropolis north of the Thames, including the City of London, and that he avail himself of the assistance of Mr. Haywood in such duty."

In conformity with this resolution, I have now the honour to lay before you my report, which will be found to agree with the conclusions arrived at on the points reported upon by Mr. Bunning, Mr. Haywood, and myself, and approved of by your honourable Commission. I beg to add, that in the numerous calculations and other considerations requisite in drawing up this report, I have had the benefit of Mr. Haywood's advice and assistance throughout.

In devising a plan of drainage for the northern portion of the metropolis, in accordance with the instructions before stated, and also in conformity with those principles by which I was guided in laying down the plan for the interception of the sewage of the southern side of the Thames,—the district appears to divide itself into two separate areas, for which different means require to be adopted, viz.:—

1. The interception of the drainage of that district, which, from its elevation above the level of the outlet, is capable of having its sewage and rainfall carried off by gravitation.

2. The interception of the drainage of that district, which, from its low lying position, will require its sewage, and in most localities its rainfall, to be lifted by steam power to a proper level for discharge.

These two districts are indicated upon the general map attached hereto by distinctive colours.

The district for natural drainage is tinted red, its area being about $25\frac{1}{6}$ square miles.

The district for artificial drainage is tinted blue, its area being about $16\frac{1}{6}$ square miles.

In the two small tracts coloured dark blue, viz., the southern part of the Isle of Dogs, and a narrow tract on the west side of the river Lea, it is intended to allow the rainfall to run into the Thames and the Lea respectively; the area of these two tracts amounts together to $1\frac{2}{3}$ square miles.

	RAINFALL.	SEWAGE.
	Sq. Ms.	*Sq. Ms.*
The total area, therefore, proposed to be drained by natural outfall from the district coloured red, will be about	$25\frac{1}{6}$	$25\frac{1}{6}$
The total area proposed to be drained by the application of steam power from the district coloured blue, will be about	$14\frac{1}{3}$	$16\frac{1}{6}$
The total area being about	$39\frac{1}{2}$	$41\frac{1}{3}$

It

It will be observed, that the district lying to the south-west of the portions tinted red and blue upon the general plan, is not included in the foregoing calculations of areas, although it contains a portion of the Counter's Creek and the Fulham and Hammersmith districts, the total area of which is about 16 square miles. Of this area but a very small portion is at present built upon; and probably, if one half or eight square miles is estimated as requiring the provision of means for interception of its sewage and rainfall, it will include an area which may not be built upon and populated for the next half century. I have not, therefore, deemed it needful to provide in my plan for the interception of the sewage and rainfall of a larger area than eight square miles.

An additional reason for not doing so is, that the establishment of the Metropolitan Sewage Manure Company's Works is in the heart of the district, which is eminently adapted for the application of sewage water as a manure, and affords grounds for belief that the whole of the sewage produced in the district may be profitably applied, and that the interception of the sewage, even of the eight square miles, may not be rendered necessary, although, to guard against contingencies, I have provided for that area in calculating the sizes of the main low level line.

In the event, therefore, of the sewage not being applied as expected, it may be lifted and discharged with the rest of the northern sewage at Barking Creek; but it will be needful in that case to extend the Whitehall sewer from Scotland-yard, so as to intercept the main low level sewer at Chelsea-road.

Having described the tracts to be drained, I have now to lay before the Committee a statement of the means by which it is proposed to accomplish the effectual interception of sewage upon the principles laid down.

Commencing with the upper portion of the tract coloured *red* upon the general plan, and taking as a starting point the pumping station (hereafter to be more fully alluded to) on the eastern bank of the river Lea, at which point the whole of the sewage of both the high and low level districts will be concentrated, the main high level sewer commences and crosses over the river Lea, near the "Four Mills," proceeding in a westerly direction under the East and West India Dock Railway, and the Blackwall Extension Railway, beneath the Regent's Canal, to the east end of the Bethnal Green-road, at the crossing of the Cambridge Heath-road, at which point it will be joined by the proposed northern diversion of the Hackney Brook, which drains an extensive district up to the water-shed line north of London, including Hackney, Stoke Newington and Holloway, and part of Highgate and Hampstead; from thence the main sewer proceeds along the Bethnal Green-road, Church-street, Old-street, Wilderness-row (where a short branch from Coppice-row will join), to Brook-street Hill, from thence to Little Saffron Hill, where a distance of about 100 yards is proposed to be carried by an aqueduct over the Fleet valley, thence along Liquorpond-street, at the end of which it will receive a branch from Piccadilly on the south side, and a diversion of the Fleet River on the north side, thence along Theobald's-road, Bloomsbury-square, Hart-street, New Oxford-street to Rathbone-place (where it receives a diversion of the Regent-street sewer from Park-crescent), along Oxford-street, and extending thence across Regent-circus to South Molton-lane (where it will intercept the King's Scholars Pond sewer), continuing still along Oxford-street to Grand Junction-road, Uxbridge-road, where it is joined by the Ranelagh sewer, the sewage of which it is capable of receiving; and at this point it terminates.

	Miles.	*Yards.*
The length of this main high level sewer will be about -	7	1,143
The Hackney Brook branch, north - - - - -	6	1,417
The Coppice-row branch, north - - - - - -	- -	1,135
The Piccadilly branch, south - - - - - -	1	1,585
The interception of the Fleet up the Gray's-Inn-road, north - - - - - - - - - - -	1	266
The Rathbone-place and Cleveland-street interception of the Regent-street sewer, north - - - - -	- -	1,600
Making a Total of - - -	19	106

With respect to the low level tract coloured blue on the general plan, it is proposed (commencing as before at the lifting point on the eastern bank of the river Lea) to construct a sewer at a depth of 47 feet below the invert of the high level sewer, proceeding beneath the river Lea, near to Four Mills Distillery, taking the north-western bank of the Limehouse Cut, at which point it receives the branch intended to intercept the sewage of the Isle of Dogs; thence continuing along the bank of Limehouse Cut through a portion of the Commercial-road, Brook-street, and beneath the Sun Tavern Fields into High-street or Upper Shadwell, at a point opposite to the church; thence along Ratcliffe Highway and Upper East Smith-field, across Tower-hill, through Little and Great Tower-streets, Eastcheap, Cannon-street, Little and Great St. Thomas Apostle, Trinity-lane, Old Fish-street, and Little Knight Rider-street; thence beneath houses in Wardrobe-terrace, and on the eastern side of St. Andrew's Hill along Earl-street to Blackfriars Bridge. From Blackfriars Bridge it is proposed to construct the sewer along the river shore to the junction of the Victoria-street sewer at Percy

 Wharf;

Correspondence, &c.

Wharf; which sewer between Percy Wharf and Shaftesbury-terrace, Pimlico, becomes thus an integral portion of the intercepting line; at Bridge-street, Westminster, a branch from the Victoria-street sewer is intended to proceed along Abingdon-street and Millbank-street, as far as and for the purpose of taking up the King's Scholars Pond and other sewers at their outlets into the Thames.

From Shaftesbury-terrace the Victoria-street sewer is proposed to be extended through Eaton-square and along the King's-road, Chelsea, to Park Walk, intercepting all the sewers along its line, and terminating at a point where the drainage of Kensington may be brought into it without pumping.

	Miles.	*Yards.*
The total length of the main low-level sewer, including the extension of the Victoria-street sewer to Chelsea, will be about - - - - - - - - - -	8	1,601
The length of the branch southwards and westwards for the drainage of the Isle of Dogs, about - - - -	4	360
The branch from Bridge-street, Westminster, along Millbank - - - - - - - - - - - -	1	1,300
The Total Length being about - - -	14	1,501

Having now described the whole of the lines of intercepting sewers, westward of the proposed pumping station on the eastern bank of the river Lea, I have in the next place to lay before you a similar statement as regards their proposed extension from that point to the outlet.

The invert of the high level sewer at the pumping station will be 20 feet above the Ordnance datum; the invert of the lower level sewer will be 27 feet below the Ordnance datum: the difference between the two being about 47 feet, the sewage of the lower level will thus be lifted to the higher level by steam-power, and both will be conveyed by two parallel lines of sewers from the pumping station to the bank of the river Roding, being the eastern extremity of Gallion's Reach. The length of this extension will be four miles.

At this point the level of the inverts of the parallel sewers will be eight feet below high-water mark; and here it is intended to collect the sewage into a reservoir during the flood-tide, and discharge the same with the ebb-tide immediately after high water; and as it is estimated that the reservoir will be completely emptied during the first three hours of the ebb, it may be safely anticipated that no portion of the sewage will be returned, with the flood-tide, to within the bounds of the metropolis.

The inclination which has been assigned to the whole of the lines of sewers, with the exception of an inconsiderable portion, is not less than four feet per mile, or 1 in 1,320.

The sewers are calculated to carry off a fall of rain equal to a quarter of an inch in 24 hours, in addition to the average daily flow of sewage, which, in anticipation of the progressive increase in the population, has been assumed at double the present water supply.

The pumping power needed to raise the sewage and rainfall of the lower level to the required height (or 47 feet) is estimated at 1,100 horses power, in order to meet which it is proposed to erect two 550 horse-power engines, together with a third engine of equal power (550 horse-power) to meet the contingency of accident, or want of reparation.

An Abstract of the various lengths of sewers proposed will be as follows, viz:—

	Miles.	*Yards.*
Of the high level sewer and its branches - - -	19	106
The low level ditto, and branches - - - -	14	1,501
The extension from the pumping station to the point of discharge at Barking Creek (parallel sewers), four miles in length - - - - - - - - -	4	—
Making a Total of - - -	37	1,607

The whole of the sewage and rainfall, with the trifling exception before stated, of the areas coloured red and blue upon the plan (which at present discharge by the various outlets into the Thames), will be diverted and carried down to Barking Creek, excepting upon the occurrence of long-continued and heavy rains or unfrequent and violent storms, when the surplus water will be carried off by certain of the existing outlets into the river; but upon all such occasions the first scour or cleansings of the sewers will be conveyed to the main outlet at the river Roding.

From the time consumed in the manifold considerations, necessarily involved in works so extensive

extensive in their nature, I have been prevented from laying before you a detailed estimate of the cost of the plan of interception. I am, therefore, only able to submit approximately, that I estimate the cost of the whole of the lines of sewers, the pumping-engines, and station, the reservoir, tidal gates, and other apparatus, at one million and eighty thousand pounds (1,080,000 *l.*)

This estimate does not include the sums required for the purchase of land and houses, which may be needed for the site of the pumping engine-house, and compensation for certain portions of the lines of sewer.

I have, &c.
(signed) *Frank Forster.*

Enclosure No. 2, in No. 5.

Metropolitan Sewers.

The Engineer's Report on *Surrey* and *Kent* Drainage.

My Lord and Gentlemen, 1, Greek-street, Soho-square, 1 August 1850.

In obedience to instructions which I had the honour to receive from you on the 8th ult., I now proceed to furnish a report and estimate for a complete system of drainage for the Surrey and Kent districts, including extensive alterations in the inclinations of existing sewers.

Notwithstanding the labour and ingenuity displayed in many of the plans for the drainage of the Metropolis sent in last year, some of which, as you stated in your report of the 8th of March, dealt ably with the general drainage on the north side of the Thames, I have been, as you are well aware, in laying out the plan of drainage for the south side, able to derive little or no practical assistance from any of them, which is to be accounted for, doubtless, by the necessarily defective data on which they were based, owing to the imperfect nature of the information which it was then in the power of the Commissioners to supply to their various authors; but I feel it my duty to acknowledge in the outset the very valuable assistance I have received from plans and suggestions prepared, after consulting the block plans and subterranean surveys, by a member of your honourable Commission, who kindly placed them in my hands during the preparation of the plan I have now the honour to submit.

In drawing up this report I have, under your instructions, adopted the following principles for my guidance:—

1. To keep the river Thames free from sewage at all times of the tide from Woolwich Reach upwards.
2. To abolish all open ditches and cesspools, as well as defective, shallow, or high level sewers.
3. To maintain a continual and unintermitting flow, with the aid of lifts where necessary, in all the sewers along their whole length, by which the evils arising from pent-up sewage, viz., the generation of noxious gases, and the unavoidable formation of deposit in the sewer during its stagnation, may be avoided.
4. To construct the sewers at inclinations so proportioned to the volume of fluid to be carried off by each, that the velocity of the current shall keep them clear of deposit without the need of regular periodical flushing, which experience has shown to be not only troublesome and expensive in its operation, but also very injurious to the sewers and drains in which it is practised.
5. To form the main sewers at such a depth as not only to receive the drainage of the deepest existing sewers, but to answer the purpose of main drains capable of extension towards the extremities of the district.
6. To provide a natural escape by the power of gravity alone for storm waters and land floods, independent of the ordinary sewers, whose contents will, on the south side of the Thames, require artificially lifting, and to construct the new sewers of such sizes only as may be sufficient to take the general drainage of the district, including ordinary rainfalls, connecting them at about mean low water with outlets for heavy floods.
7. To follow existing public streets, roads, or paths, so as to avoid heavy compensation for injury to private property, whenever this can be done, without causing injurious curves or undue prolongation of the sewers and consequent loss of level.
8. To extend the ramifications of the sewers after the main lines are completed into all the streets, at such depths and with such inclinations as to give perfect self-cleansing street drainage, and the opportunity for efficient house drainage.

The following is a general outline of the means proposed to effect the objects above named:—

I beg to recommend the top of Woolwich Reach as the point for delivering the sewage into the river, because I believe that the matter so delivered at and after high-water, and in the centre, and at the bottom of the stream, will not rise to the surface, so as to inconvenience the inhabitants of Woolwich. If, however, it should be deemed expedient, either for agricultural purposes or for any other reason, to convey the sewage below Woolwich to some

Correspondence, &c.

point near Erith before its delivery into the Thames, it may be effected by means of iron pipes across the Marshes and through Woolwich, to be supplied by an engine and stand-pipe erected at or near the Woolwich-road, near Greenwich-gate.

Commencing with the outlet at a point eight miles below London-bridge, it is proposed to form a double reservoir capable of holding at least 24 hours' drainage, covered over, and elevated to such a height as to discharge the whole of its contents at high water, delivering them by means of pipes near the middle and at the bottom of the river. The sewage will be lifted into the reservoir at this point (by means of an engine) from the main sewer, the invert of which is proposed to be at about mean low water, and ten feet below the surface of the marshes.

From hence the course of the main sewer will be across Greenwich Marshes, along Woolwich Lower-road, Trafalgar-road, and Roan-street, to the Ravensbourne (where there is proposed to be a lift not exceeding 25 feet), passing under the river Ravensbourne, past the corner of the Trinity Almshouses, and crossing Union-street and Bridge-row or Collier-street.

This lift and shaft I propose to place completely under cover, and to connect with the chimney of the smoke-consuming furnace of the engine all the passages from which any gases could escape from the sewer, and I feel perfectly confident that, with these precautions, the possibility of any annoyance being caused to the neighbourhood may be obviated.

I mentioned above, that it was not proposed that the engines should have to raise all the storm waters or land floods; these will be provided for in extraordinary cases by the four existing outlets, viz., the Effra, the Earl, the Duffield, and St. John sewers, and by means of reservoirs and a diversion of the upper part of the Effra, to keep the low-lying and thickly-inhabited part of the district free from floods.

From Collier-street, a line, which may be called the "southern main line," diverges; the "northern main line" passing along the Lower Deptford-road to the crossing of the Earl sewer, from which point it strikes into a north-westerly direction, and in a straight line towards St. James's Church, Bermondsey, thence along Prospect-place to Dockhead, and thence to Gainsford-street and Tooley-street, where it unites with the Great St. John's sewer, with which are connected the Battle-bridge and its various branches; the inclination of the new sewer for the whole distance being at an average rate of about 4½ feet per mile, somewhat less near the point of discharge, somewhat more, of course, as the volume of fluid diminishes at each successive ramification of the sewers.

Returning to the diverging point at Deptford, the course of the "southern main line" will be by Loving Edward's-lane, nearly in a straight line with Old Kent-road at Hatcham, along the Old Kent-road to Surrey Canal-bridge, which is at the point of divergence of an intermediate main line to be afterwards described; the southern main line will proceed by Neat-street and Albany-road in a straight line across to St. Mark's-road, and by Camberwell New-road to St. Mark's Church, Kennington. Here it will pass under the Effra sewer, and, by a connection therewith, will receive its ordinary run of drainage; the floods of the Effra being provided for by a relief line about 1,200 yards long, passing along the Oval and Harleyford-street to Vauxhall-creek, the present open and most offensive portion of the Effra from Kennington-road to Vauxhall being filled up and abolished.

The level of the southern main line at St. Mark's Church would be about 1·0 or nearly 7 feet below the deepest sewer existing there at present, and will afford unexceptionable drainage for Stockwell and Clapham, Balham-hill, and the whole district lying between the Brixton-road and Wandsworth-road.

The course of the "intermediate line," diverging at the Surrey Canal-bridge, proceeds along the Old Kent-road to the Bricklayers' Arms, where it will divide: one arm passes along the New Kent-road to the Elephant and Castle, where it will receive the drainage of the Walworth and Kennington-roads and a portion of London-road and St. George's-road.

The other more northern arm of this intermediate sewer proceeds from the Bricklayers' Arms along part of the Dover-road and Trinity-street, crosses Blackman-street, continuing along Great Suffolk-street, across Southwark Bridge-road, along Suffolk-street, across the end of Gravel-lane, through Nelson-square, to Rowland Hill's Chapel, at which point its level will be 0·40, being about 1 foot 2 inches below the Battle-bridge sewer. This intermediate main line will be 2¼ miles in length from the Surrey Canal-bridge to Rowland Hill's Chapel, one-half of it through streets at present without deep sewers, and one-half along the line of an existing deep sewer, for which it will form a substitute, and the more southern arm passing up to and dividing at the Elephant and Castle, about one mile in length, along the lines of existing sewers. The inclinations of the proposed new lines varying at the different parts of the sewer according to the branches received on the principle above mentioned.

Consequent upon this intermediate main line being carried into the middle of the populous district will be an alteration of the levels of above six miles of existing sewers in the following streets: viz., New-cut, Cornwall-road, Waterloo-road, Borough-road, Newington-causeway, Westminster Bridge-road, Lambeth-road, Westminster-road, parts of London-road, and St. George's-road. This will involve in addition much alteration in secondary drains and in house drainage; and I cannot quit this part of the subject without again suggesting to the Commissioners the expediency of watching and testing the working of the present main drains, as soon as the main sewers are sufficiently completed to do so, before they proceed to the extensive alterations in the existing sewers which the contemplated interference with them will involve.

I beg now to lay before you my estimate of the cost of draining the district according to the

the system above described; but before doing this I would observe that in drawing up this report and these estimates, I have thought it desirable to put down the outside amount of lift, of depth of drains, &c., in order if there be any error it may be on the right side. In this estimate I have neither included compensation for passing through or under private property, which, however, from the lines adopted in accordance with the principle you laid down, will be comparatively trifling, nor the cost of the detailed drainage, to estimate which will be a work of much time and lengthened inquiry. In any case this will involve a considerable outlay, but as it is dependent on the settlement and partial completion of the main drainage, it would have been premature to go into it here; neither have I taken into account the cost of extending the system of drainage into the suburban districts, a provision which it becomes daily more imperative to make.

ESTIMATE of COST of SYSTEM above described.

	Ms.	*Fur.*	*Cost.* £.
Main trunk drain from outlet in Greenwich Marshes to the lift at the Ravensbourne	2	0	25,887
Reservoirs and outlet pipes	-	-	20,280
Pumping engines and apparatus	-	-	27,400
From the lift at the Ravensbourne to a point near St. James' Church, Bermondsey, north main line	2	5	46,930
Extension of north main line from St. James' Church to the Great St. John sewer	0	6	8,000
South main line from Collier-street, Deptford, to St. Mark's Church, Kennington	4	0½	49,600
Flood line of Effra	0	5½	7,200
Intermediate main line from Surrey Canal-bridge, with northern arm to Rowland Hill's Chapel	2	2	12,000
Southern arm along New Kent-road	1	0	5,000
Alteration of existing Sewers to connect with the intermediate main line, &c. 6 m. 0 fur.	-	-	32,000
Effra flood line diversion by Peckham	-	-	7,000
	13	3	241,297

I have, &c.
(signed) *Frank Forster.*

To the Hon. Metropolitan Commissioners of Sewers.

No. 6.

Richard Jebb, Esq., to the Right honourable Viscount *Palmerston*, M.P.

Metropolitan Commission of Sewers, 1, Greek-street, Soho,
My Lord, 25 February 1853.

IN compliance with your Lordship's directions, I have the honour to enclose the following Returns:—

No. 1. Of the instances of failures of pipe sewers within the districts under the jurisdiction of the Metropolitan Commissioners of Sewers, contained in a Report from Mr. Bazalgette, General Surveyor of Works to the Commission.* Enclosure, No. 1.

No. 2. Of the works either executed or decided upon, to be paid for out of the balance available for extraordinary works in the several districts, for the year ending the 24th July 1853, after providing for the current ordinary expenditure of the Commission. When I represented to your Lordship the amount of such balance to be about 100,000 *l.*, I did not include two large items added since the Estimate, No. 3 (herewith enclosed), was prepared; the addition of them swells the amount, as estimated, to 134,663 *l.* 16 *s.* 3 *d.* Enclosure, No. 2. Enclosure, No. 3.

I was

* This Paper was presented to the House of Commons, and printed (No. 668, Session 1853.)

Correspondence, &c.

I was also directed by your Lordship to submit to you in writing the views of the Commissioners respecting the amendments required in the law regulating their powers. Before proceeding to do so, it may be useful to state very shortly a few leading facts, which may serve to throw light upon the matters forming the main subject of the present communication.

From a period shortly subsequent to the passing of the "Statute of Sewers," 23 Hen. 8, c. 5 (the foundation of the modern Sewers Law), to November 1847, an area of about 200 square miles surrounding the city of London, and having its greatest extent in a south-westerly direction from the city, was divided for sewerage purposes into numerous districts very unequal in extent. These districts were allotted amongst seven distinct Commissions (latterly increased to eight), each Commission having under its jurisdiction one or more of such districts. A scheme of consolidating the whole of them was commenced in November 1847, by appointing the same body of persons as Commissioners in each of the eight Commissions, and completed in the following year by the passing of the 11 & 12 Vict. c. 112, which enabled Her Majesty to include them all under one Commission; and power was given to extend the metropolitan area, by including any further portions of the four metropolitan counties (excepting the City of London), not more than 12 miles in a straight line from St. Paul's; a power which, if exercised to the utmost limits, would have extended the jurisdiction of the Metropolitan Commissioners over an area of about 450 square miles. This power of extension, however, has been very sparingly exercised; the limits of the Metropolitan Commission now correspond very nearly with the limits of the old separate Commissions, embracing, as they did, an area of about 200 miles.

Under both the old and the new arrangement, the Commissioners for the last 80 years have, by virtue of a discretionary power vested in them, forborne to exercise their jurisdiction in the outlying parts. The active jurisdiction of the old separate Commissions, down to 1848, was confined to a total area of about
Enclosure, No. 4. 42 miles, indicated by the part coloured blue in the accompanying Map. In 1848 and 1849, the consolidated Metropolitan Commission considerably extended the area of active jurisdiction, by taking in 72 miles more, coloured red in the same Map, thus making the entire area now actually superintended by them 114 miles.

I would beg leave to call your Lordship's special attention to the extensive new area thus taken in hand since 1847, including many large villages and towns, as well as the rapidly increasing suburbs of the metropolis itself. It may be described generally as almost entirely destitute of sewerage, previously to 1847; for although the records of the old Commissions in the last century show instances of works executed in those as well as in more distant parts, such works consisted merely in the clearing out and embanking of open watercourses, by way of precaution against land floods, and not in the construction of covered channels for the reception and conveyance of house soil, as implied in the modern popular idea of "sewers." The demands for sewerage in these newly added parts are enormous, whilst the rates derived from them are comparatively small, in consequence of the scattered position of the villages, streets, and houses, and the large proportion of semi-rural area, intermixed with the more thickly peopled parts.

With respect to the older and denser portions of the metropolitan districts, it may be generally asserted that, however favourable an aspect they present when compared with the newly added parts, their condition is still far from complete, and that no considerable portion of the metropolis outside the City could be named in which extensive works are not still required.

I would next take the liberty of adverting to the exertions of the Commissioners, under the several Commissions issued by virtue of the Act of 1848, to meet the wants of the metropolis; and in order to exhibit both the means at their disposal, and their employment of those means, I have the honour to forward the two
Enclosure, No. 5. following Returns; No. 5, being an abstract of cash accounts, showing the receipt and expenditure of the Commission for a period of rather more than 3½ years, namely, from January 5th, 1849 (the date of the first Consolidated Commission), to
Enclosure, No. 6. July 24th last (the date of the Commission now in force); No. 6, Return of works executed by the Commissioners at the public expense, and also of works executed at the cost of private parties, under the superintendence of the Commissioners, covering the same period.

The

The Returns numbered 2 and 3, already referred to, will, as far as can be done at present, convey similar information for the period that has since elapsed.

With reference to Return No. 5, it is proper to remind your Lordship that, by the Act of 1848, the Commissioners were enabled to levy rates to the amount of 1 *s.* in the pound annually; that by the continuance Act 1851 (14 & 15 Vict. c. 75), which was passed on the 7th August in that year, the amount was reduced to 3 *d.*; and that by the continuance Act of last Session, passed June 30th, 1852 (15 & 16 Vict. c. 64), the amount was raised to 6 *d.*, its present limit, producing an income of about 200,000 *l.*

With such powers of taxation, it will readily appear, from Return No. 5, that during the period of three-and-a-half years embraced in it, the Commissioners did not impose a heavy burthen on the metropolis; for the aggregate of the district rates then raised, supposing they had been levied equally over all the districts, would have amounted to less than 8½ *d.* in the pound for the whole period, averaging for each year less than 2½ *d.* This limited exercise by the Commissioners of their rating power was prompted, first, by a regard to the former practice, which was not to rate any one district every year, nor to a large amount on the average of years; and, secondly, by an intention, in accordance with the design of the Act of 1848, to execute the principal works of sewerage, not out of income, but with money to be borrowed on the security of the rates, and to be repaid in a period of 30 years. In their expectation of borrowing, however, the Commissioners have been disappointed, the clauses for that purpose inserted in the Act having, on trial, proved defective. The amount due on mortgage of the rates, at the commencement of the new system, was about 63,000 *l.*, and it has now increased to only about 100,000 *l.*

Return No. 6 shows that, in comparison with the preceding years, a very small amount of works was executed in the first half of 1852, being only 15,150 *l.*, or at the rate of 30,300 *l.* per annum. This was caused by the sudden and unexpected reduction of the rating power to the limit of 3 *d.* in the pound, as beforestated, which obliged the Commissioners immediately to suspend the execution of all works previously ordered, except such as had been actually commenced or contracted for. The suspension caused great dissatisfaction and disappointment to the public, and the ill effects of it are still experienced by the Commissioners.

Such a proceeding has another and more permanent inconvenience. It prejudices in public estimation the value of the security which the Commissioners are enabled to offer to capitalists, who shrink from lending when they see the fund which has to pay their interest and principal thus liable to be suddenly reduced. And I may be pardoned for observing that the risk of sudden and frequent fluctuations in both the fiscal and other powers of the Commissioners must continue so long as such powers depend upon a temporary Act, renewable at short intervals, which almost invites crude and inconvenient amendments on each occasion of its renewal. In the particular instance that has given rise to these remarks, the Commissioners had no opportunity of expressing their views upon the subject, much less of making timely preparation for the change then suddenly effected in so vital a branch of their powers.

I would therefore beg leave most respectfully to represent the desirableness, at the earliest practicable period, of placing upon a permanent footing, as regards its powers as well as its constitution, the body to which are to be confided the management and superintendence of the sewerage of the metropolis.

It is my duty, in the next place, to call your Lordship's attention to the Borrowing Clauses in the Act of 1848. In order to make them effective, it would be desirable to limit the amount of loan for which the rates may at any one time stand as a security. At present there is no limitation; which circumstance, coupled with the express exclusion of any priority amongst the different encumbrancers, deters capitalists from lending, from an apprehension lest the Commissioners might overcharge the rates. If a limitation be imposed, bearing a just proportion to the income, there will be no need of establishing any priority amongst mortgagees. In relation to an income of 200,000 *l.*, produced by a sixpenny rate, from 1,500,000 *l.* to 1,600,000 *l.* appears to be the proper limit to establish, as the greatest amount to be charged at any one time on the rates.

Correspondence, &c.

In furtherance of the same object, it will be necessary to give mortgagees every practicable facility for the recovery of their debts; and to that end it will be proper, amongst other things,—

(1.) To amend the clause relating to the appointment of a receiver, for the benefit of mortgagees who may fail in obtaining satisfaction of their debts from the Commissioners.

(2.) To provide, that where sufficient rates for payment of the mortgage debts shall not have been made, either through the neglect of the Commissioners, or because of a suspension of the Commission, power shall be given to two Justices, not only (as at present) to make a rate, but also, which the present law omits, to wield all the powers conferred upon the Commissioners for enforcing payment of rates in ordinary cases.

Notwithstanding the intimation conveyed to me by your Lordship, of the difficulty there might be in advancing the power of rating beyond its present limit, and although it will be the duty of the Commissioners to administer, to the best of their ability, such funds as Parliament may entrust them with, I think it incumbent on me to point out the inadequacy of a sixpenny rate to accomplish all that the public now appear to expect in the districts south of the Thames. That division of the metropolitan area, as compared with the northern division, labours under every species of disadvantage; its area is larger, it is more deficient in sewerage, the falls are worse, and the income from the rates is smaller, being only between a third and a fourth of the income of the northern division. The accom-

Enclosure, No. 7.

panying Estimate of the loans which may be raised on a sixpenny rate, and of the sums applicable for new works in the next six years, in the two divisions respectively, may be taken as sufficiently accurate for the present purpose. It shows that by means of a sixpenny rate on the northern division, 1,200,000 *l.* might be borrowed, and in six years 1,511,000 *l.* might be expended in new works; whilst, on the south of the Thames, by a sixpenny rate, not more than 350,000 *l.* could be raised by way of loan, and the funds available for new works in the same period would amount to 335,000 *l.* only, or very little more than the late Mr. Forster's estimate for the main drainage of that portion of the metropolitan area, leaving nothing for its secondary drainage, which by itself would probably cost more than double that amount. It is therefore clear that a sixpenny rate is insufficient for the wants of the southern division. With a shilling rate, a loan of 700,000 *l.* might be effected, and works executed in six years to the value of 825,000 *l.* If, however, your Lordship should think it inexpedient to ask Parliament to sanction a shilling rate, or to make any distinction between the two great divisions of the metropolis, a middle course might be suggested, viz. a nine-penny rate over the entire metropolis, with a commensurate power of borrowing. This would probably enable the Commissioners to borrow 525,000 *l.*, and to execute works to the value of 580,000 *l.* in six years, so far as the south side of the Thames is concerned. It might fairly be hoped that at the end of that period, the advantage of the new works executed would be so appreciated by the inhabitants as to induce them to submit to further taxation for the completion of their works of drainage.

The next subject upon which an amendment of the law is required relates to the consolidation of districts.

At present there are about 30 different districts, varying in extent from 28 square miles to a few acres; each of these is separately rated, and its rates, after defraying its due proportion of the common establishment charges, are expended wholly within its own limits. This system works disadvantageously; it is productive of complexity and expense in the keeping of a number of distinct accounts, and in the preparation of the rates; and it prevents the concentration of the resources of several districts, so as to enable the Commissioners to commence with the larger and more important works, and afterwards add those which are of a subsidiary character. At present the Commissioners are often compelled to reverse this natural order, and sometimes to postpone indefinitely, especially in the smaller districts, the execution of the larger works, and to devote the greater part of the funds in driblets primarily or principally to the smaller.

Objections might possibly be taken to an extensive amalgamation of districts. Those districts which have already at their own cost provided themselves with sewers,

sewers, so as to leave comparatively little to be done within their own limits, might complain of having to contribute to the sewerage of new, poor, and hitherto undrained districts. But although there may appear at first sight to be some force in the objection, a comprehensive view of the subject, as well as a true and enlightened economy, excludes an over-minute attention to such considerations, because, in the practical working of the system, it might be easy to secure an equal benefit to each district. It appears, therefore, desirable to abolish all distinctions of separate districts on each side of the Thames respectively, or, in other words, to consolidate all the present rated districts into two, divided from each other by that river.

This arrangement, if acceded to, will require the adjustment of some minor particulars, such as provisions for the payment of the debts now affecting individual districts, and for the equitable imposition of rates on the present districts (which are now rated at different periods of the year) during the short interval of time that must elapse before the new system can be brought into effective operation.

I have next to advert to the mode of making and levying rates, and their application.

At present, rates must be made both at certain intervals and for certain periods, prospectively or retrospectively, and their application is governed by inconveniently stringent provisions, having reference to the periods at which the various liabilities were incurred. The present enactments on those heads are complicated and obscure, and for a great part serve no good purpose, whilst they embarrass the Commission. It would be desirable to modify the clauses to which these observations apply. The sewers rates are based upon the poor rates, being, with certain exceptions, leviable on the persons, and in respect of the property rateable to the relief of the poor. The exceptions for the most part turn on matters nearly obsolete, or they are based upon a state of things different from that which now prevails, in many cases having no foundation in reason or justice; moreover, they are generally obscure and embarrassing. It therefore appears desirable to abolish most of them, and specially to define such as it may be proposed to retain.

The next amendment required is to enable the Commissioners to render effectual the present provisions as to rating in gross, which, from certain technical causes, are now nugatory.

I have next to submit the expediency of amending the clauses relating to the judicial and magisterial functions of the Commissioners, with a view to the simplification of procedure. This applies principally to the compulsory powers of the Commissioners, exercised for the abatement of nuisances in private houses, as to which the process is now unnecessarily tedious and complicated.

In conclusion, I would beg to observe, that the Sewers Acts require amendment in numerous other particulars, but inasmuch as these relate to matters of pure detail, I will not on this occasion trouble your Lordship with an enumeration of them, but I shall be ready at all times to render every assistance in my power for effecting such amendments in the law as your Lordship may deem desirable.

I have, &c.

(signed) *Richard Jebb.*

To the Right honourable
Viscount Palmerston, M. P., &c. &c. &c.

Correspondence, &c.

Enclosure No. 2,* in No. 6.

METROPOLITAN COMMISSION OF SEWERS.

RETURN of NEW WORKS executed, in progress, or ordered, for the Payment of which the available Balance for the current Year, ending 24th July 1853, estimated at £. 134,663. 16. 3., is applicable.

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost. £.	s.	d.
Oakhurst, near Webb's-lane, Hammersmith.	Covering 104 feet open sewer - -	15	–	–
Hurlingham-road, Fulham - -	900 feet of 12-inch pipe for surface drainage— Estimated cost - £. 40 – – Contribution to be paid 20 – –	20	–	–
Turnham-green, near Old Pack Horse	190 feet 12-inch pipe - - - -	30	–	–
Harrow-road - - - - - -	620 feet 12-inch pipe— Estimated cost - £. 56 – – Contribution to be paid 26 – –	30	–	–
Sand's End, Fulham - - -	190 feet 9-inch pipe - - - -	23	–	–
Kensal-road - - - - -	2,280 feet brick sewer, 3 ft. 9 in. by 2 ft. 6 in.— Estimated cost - £. 1,592 – – Contribution to be paid 796 – –	796	–	–
Harrow-road - - - - -	730 feet 12-inch pipe - - - -	71	–	–
Ladbroke-grove, Notting-hill - -	60 feet 12-inch pipe - - - -	10	–	–
Seymour-place, Fulham-road - -	670 feet 12-inch pipe - - - -	117	–	–
Radnor-street, Chelsea - - -	265 feet 18-inch ½ brick bar. sewer, and 440 feet 12-inch pipe.	188	–	–
Chester-mews, Hyde-park - -	170 feet 12-inch pipe - - - -	32	10	–
Near Kilburn Brewery - - -	200 feet 12-inch pipe - - - -	33	–	–
Caroline-place, Chelsea, and - -	390 feet 12-inch pipe - - - -	178	–	–
Bull's-gardens, Chelsea - - -	350 feet 12-inch pipe - - - -			
Connaught-place - - - -	520 feet, brick sewer, 3 ft. 9 in. by 2 ft. 6 in.— Estimated cost - £. 258 – – Contribution to be paid 109 4 3	148	15	9
James-street, Porchester-terrace -	76 feet 12-inch, and 63 ft. 9-in. pipe -	33	–	–
Wellesley-grove, Chelsea - -	290 feet 12-inch pipe - - - -	50	–	–
Hyde-park-gate, South - - -	506 feet 12-inch pipe— Estimated cost - - £. 96 10 – Contribution to be paid 64 6 8	32	3	4
Little Grove-street, Lisson-grove -	130 feet sewer, 3 ft. by 2 ft., and 180 feet 12-inch pipe.	72	–	–
Porchester-terrace, Bayswater -	600 feet sewer, 3 ft. 9 in. by 2 ft. 6 in. -	343	–	–
Devonshire-cottages, Fulham-road -	85 feet 9-inch pipe - - - -	12	–	–
Moor-street (North end), and Halsey-street, Chelsea.	Covering over 144 feet open sewer -	35	–	–
York-street, Westminster - -	1,154 feet brick sewer, 4 ft. by 2 ft. 6 in. -	1,711	–	–
Great Cumberland-mews, Marylebone.	35 feet 12-inch pipe sewer— Estimated cost - £. 6 – – Contribution - - 1 10 –	4	10	–
James-street, and William-street, Pimlico.	280 feet of sewer, 4 ft. by 2 ft. 6 in. -			
Catherine-street, Pimlico - -	380 feet - - 3 ft. 9 in. by 2 ft. 6 in.			
Stafford-place, South, Pimlico -	260 feet - - - ditto - -			
William-street, and Palace-street, Pimlico.	500 feet - - - ditto - -			
Charles-street, Pimlico - - -	170 feet - - - ditto - -	3,423	10	6
Charlotte-street, ditto - - -	110 feet - - - ditto - -			
Stafford-place, ditto - - -	500 feet - - - ditto - -			
Ditto - - ditto - - -	135 feet - - - ditto - -			
Ditto - - ditto - - -	85 feet 12-inch pipe - - - -			
Catherine-place - - - -	90 feet - ditto - - - -			
Buckingham-street - - -	246 feet - ditto - - - -			

* As to Enclosure No. 1, *see* Note to the second paragraph of No. 6.

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost. £.	s.	d.	Correspondence, &c.
King's Scholars Pond Sewer	Filling in old course, 400 feet	100	–	–	
Castle-lane, Pimlico	605 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.				
Union-place, ditto	110 feet 12-inch pipe sewer				
Castle-court, ditto	90 feet ditto				
Pine Apple-place, ditto	90 feet ditto	1,063	5	–	
Pine Apple-court, ditto	90 feet ditto				
Castle-place, ditto	90 feet ditto				
Isabella-row, ditto	180 feet ditto				
Causton-street, Westminster	520 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	437	–	–	
Vincent-street, ditto	260 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	276	–	–	
Grosvenor-ditch	Arching over 420 feet, 5 ft. 6 in., 4 ft., and 700 feet ½ brick barrel drain 3 ft., and other works in connexion therewith.	887	–	–	
Gulstone-cottages, Westminster	175 feet 12-inch pipe	77	7	6	
Bull-court, ditto	130 feet	53	5	–	
Coulston-cottages, ditto	90 feet	42	5	–	
Clarke's-cottages, ditto	175 feet	78	7	6	
Brunswick-buildings, ditto	130 feet	57	5	–	
Regent's-gardens, ditto	170 feet	73	5	–	
Great Peter-street, ditto	880 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.				
New Peter-street, ditto	550 feet				
Duck-lane, ditto	320 feet				
Perkin's-rents, ditto	280 feet				
Duck-yard, ditto	100 feet 12-inch pipe				
Pump-court, ditto	180 feet				
Queen's-place, ditto	120 feet	3,227	–	–	
Saunder's-court, ditto	100 feet				
George-court, ditto	50 feet				
Leg-court, ditto	180 feet				
John's-buildings, ditto	200 feet				
Elizabeth-place, ditto	120 feet				
Bull Head-court, ditto	180 feet				
Ann's-place, ditto	50 feet				
Carrier-street, St. Giles	Brick sewers and other works; viz. 512 feet, 4 ft. by 2 ft. 6 in.; 72 feet, 3 ft. 9 in. by 2 ft. 6 in.; 84 feet 12-inch pipe; 280 feet 9-inch; 776 feet 6-inch and 31 feet 4-inch (the 6-inch and 4-inch pipes for surface drainage).	550	–	–	
Crown-court, Strand	250 feet 12-inch pipe	87	10	–	
Bateman's-buildings	300 feet 15-inch pipe	140	–	–	
Portugal-street, Lincoln's Inn-fields	450 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.— Estimated cost £. 290 – – Contribution to be paid 66 10 –	223	10	–	
Drury-lane, Wych-street and Newcastle-street.	1,400 feet of sewer, 4 ft. 6 in. by 3 ft.	2,344	10	–	
Russell-court, Drury-lane	380 feet ditto, 3 ft. 9 in. by 2 ft. 6 in.	439	19	3	
White Hart-street and Blackmore-street.	680 feet ditto ditto	753	11	–	
Newcastle-street and Stanhope-street	870 feet of sewer, 4 ft. by 2 ft. 8 in.	1,101	7	3	
Princes-street	285 feet ditto, 3 ft. 9 in. by 2 ft. 6 in.	332	17	3	
Holles-street, Drury-lane	290 feet ditto ditto	311	8	–	
Broad-court, ditto	390 feet ditto ditto	405	9	–	
Brown's-buildings	125 feet 12-inch pipe sewer	78	2	6	
New Church-street	400 feet 18-inch brick barrel	199	15	4	
Craven-yard	130 feet 12-inch pipe sewer	57	5	–	
Feathers-court	150 feet 18-inch brick barrel	75	6	9	
Bennett's-court	190 feet 12-inch pipe sewer	93	15	–	
Princes-court	190 feet ditto	70	15	–	
Pitt's-place	230 feet ditto	105	15	–	
Orange-court	265 feet ditto	102	12	6	
Clare-court	230 feet ditto	110	15	–	
Lincoln-court	290 feet 18-inch brick barrel	167	4	5	
Craven-buildings	190 feet 12-inch pipe	70	15	–	
Little Catherine-street	145 feet ditto	61	12	6	
Windsor-court	160 feet	57	–	–	
Cross-court, Russell-court	90 feet	43	5	–	
Harford-place	170 feet	62	5	–	
Marquis-court	145 feet 12-inch pipe sewer	58	12	6	
Nag's Head-court	180 feet ditto	71	10	–	
Cross-court	145 feet ditto	51	12	6	
Duke's-court	245 feet ditto	101	2	6	
Holywell-street	460 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	427	10	9	
Warren-street, Camden-town	330 feet of ½ brick sewer, 3 ft. 9 in. by 2 ft. 3 in.	291	10	–	
Kentish-town-road	1,430 feet of sewer, 4 ft. by 2 ft. 8 in.	1,057	–	–	

Correspondence, &c.

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost. £.	s.	d.
Harmood-street - - - -	312 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.— Estimated cost - £. 156 – – Contribution to be paid 60 – –	96	–	–
High-street, Camden-town - -	Filling up old sewer-work, in connexion with building new sewer.	35	–	–
Tone's-buildings, Somers-town -	340 feet 12-inch pipe - - - -	60	–	–
Kentish-town-road - - -	260 feet of sewer, 4 ft. by 2 ft. 8 in. -	221	–	–
Hampstead-road - - - -	160 feet of sewer, 4 ft. 6 in. by 2 ft. 9 in.— Estimated cost - £. 100 – – Contribution - - 25 – –	75	–	–
St. John's Park Estate - - -	Size of sewer built at expense of Kelly & Lawford to be increased from 4 ft. by 2 ft. to 4 ft.	67	–	–
Ditto - - - - - -	500 feet of sewer, 4 ft. diameter— Estimated cost - £. 375 – – Contribution to be paid 200 – –	175	–	–
Wilstead-street, Somers-town - -	180 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	160	–	–
Wait's-place, Camden-town - -	140 feet of 12-inch pipe - - -	35	–	–
Haverstock-hill, by Turnpike-gate -	60 feet - ditto - - - -	12	–	–
From St. John's Park, Hampstead, through South End, Green Pond-street, Lower Heath and Flask-walk to High-street.	5,283 feet of sewer, 4 ft., 4 ft. by 2 ft. 8 in., and 3 ft. 9 in. by 2 ft. 6 in.; viz. 2,153 feet, 4 ft.; 1,460 feet, 4 ft. by 2 ft. 8 in., and 1,670 feet, 3 ft. 9 in. by 2 ft. 6 in.	5,922	11	6
From Lower Heath up John-street and Devonshire-hill, Hampstead.	1,422 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	1,280	2	8
From the Outlet in Brill-row, Somers-town, to Hampden-street.	950 feet of sewer - - ditto - -	875	–	–
From Brill-terrace, up Hampden-street, north side of Clarendon-square, Gee-street to Seymour-street.	1,380 feet of sewer - - ditto - -	1,304	–	9
From Charlton-street, south side of Clarendon-square, Charles-street to Seymour-street.	640 feet of sewer - - ditto - -	641	–	8
Clarendon-square, west side - -	360 feet of sewer - - ditto - -	307	19	11
Ditto - - east side - -	450 feet of sewer - - ditto - -	381	14	–
Southampton-mews, Euston-square -	135 feet 9-inch pipe from gully to sewer	25	–	–
Highbury-place, Islington - -	150 feet of sewer, 2 ft. 6 in. by 2 ft. 6 in.	58	19	–
Green Lanes, Highbury New Park -	730 feet of sewer, 4 ft. by 2 ft. 6 in. -	400	–	–
Compton-street, Clerkenwell - -	440 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 280 feet 12-inch pipe.	250	–	–
Upper-street, Islington - - -	56 feet 12-inch pipe - - - -	10	–	–
Park-street, Islington - - -	250 feet brick sewer, 3 ft. 9 in. by 2 ft. 6 in., and 440 feet 12-inch pipe.	171	–	–
Cumberland-street and Kent-street, Hackney-road.	500 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 400 feet 9-inch pipe.	270	–	–
Baltic-street, Old-street - - -	120 feet 12-inch pipe - - - -	21	–	–
New Ivy-street, Hoxton - -	290 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 320 feet 12-inch pipe.	267	–	–
Hornsey-lane, Holloway - -	1,040 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.— Estimated cost - £. 300 – – Contribution to be paid 175 – –	125	–	–
Martha-street, Haggerstone - -	164 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 284 feet 12-inch pipe— Estimated cost - £. 114 – – Contribution to be paid 40 – –	74	–	–
Charter-house-street - - -	70 feet 12-inch pipe— Estimated cost - £. 13 – – Contribution to be paid 9 12 –	3	8	–
Holloway-road - - - - -	1,886 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.— Estimated cost - £. 1,400 – – Contribution to be paid 150 – –	1,250	–	–
Albion-grove, Stoke Newington -	30 feet 12-inch pipe - - - -	5	–	–
Constable-alley, Hoxton - -	360 feet 12-inch pipe - - - -	68	–	–
Felton-street, Hoxton - - -	410 feet 12-inch pipe - - - -	98	–	–
Richard-street, Liverpool-road -	400 feet 12-inch pipe - - - -	70	–	–
Back Saville-row - - - -	300 feet 12-inch pipe - - - -	37	–	–

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost.	Correspondence, &c.
		£. s. d.	
Glasshouse-street, Rosemary-lane -	326 feet 12-inch pipe - - - -	45 – –	
Darby-street, Rosemary-lane - -	190 feet 12-inch pipe - - - -	27 – –	
North Brixton, near Ponsford's Nursery-grounds.	60 feet 9-inch pipe - - - -	5 – –	
Pepper-street, Southwark - -	150 feet 18-inch barrel sewer - -	50 – –	
Canterbury-road, Brixton - -	Covering 300 feet of Effra sewer— Estimated cost - £. 600 – – Contribution to be paid 300 – –	300 – –	
Lorn-road, Brixton - - -	950 feet 12-inch pipe— Estimated cost - £. 110 – – Contribution to be paid 55 – –	55 – –	
John-street, Cornwall-road - -	400 feet 12-inch pipe - - - -	50 – –	
Albany-road, Kent-road - -	370 feet 12-inch pipe - - - -	50 – –	
Robert-street, Brixton - - -	800 feet 12-inch pipe - - - -	100 – –	
William-street, Old Kent-road -	150 feet 9-inch pipe - - - -		
Pitt-street, ditto - - - -	500 feet 12-inch pipe - - - - Estimated cost - £. 85 – – Contribution to be paid 30 – –	55 – –	
Tooley-street, Borough - - -	60 feet of sewer to be arched, 5 ft. 6 in.	15 – –	
Providence-place, New Kent-road -	50 feet of 15-inch, and 600 feet of 9-inch pipe.	100 – –	
High-street, Lambeth - - -	260 feet 12-inch, and 330 feet 9-inch pipe.	60 – –	
Loughborough Park-road - -	920 feet 9-inch pipe— Estimated cost - £. 80 – – Contribution to be paid 60 – –	20 – –	
Broadway, Deptford - - -	150 feet of sewer, 4 ft. 6 in. by 3 ft. 6 in.	120 – –	
Albion-street, Rotherhithe - -	320 feet of 18-inch barrel drain, ordered 7th Dec. 1852, to be substituted for similar length of 18-inch and 15-inch pipes.	75 – –	
Richard-street, Lambeth - -	470 feet 12-inch pipe - - - -	55 – –	
Jacob-street, Jacob's Island - -	120 feet 9-inch pipe - - - -	10 10 –	
Francis-street, Westminster-road -	150 feet 12-inch pipe - - - -	17 10 –	
Russell-street, North Brixton - -	640 feet 12-inch pipe - - - -	80 – –	
London-street, Southwark - -	180 feet 12-inch pipe, and 130 feet 9-inch pipe— Estimated cost - £. 47 – – Contribution - - 15 – –	32 – –	
Sutherland-terrace - - - -	80 feet 9-inch pipe - - - -	8 – –	
Belvidere-crescent, Lambeth - -	300 feet 12-inch pipe - - - -	55 – –	
Horsley-street, Walworth - -	270 feet 12-inch pipe - - - -	32 – –	
Providence-buildings, New Kent-road.	Works to connect high-level sewer with deep sewer in New Kent-road, viz. 50 feet 15-inch, and 600 feet 9-inch.	65 – –	
Thomas-place, Bermondsey - -	240 feet of pipe-sewer, 9-inch - -	24 – –	
Wellington-place, Kent-road - -	200 feet 18-inch brick barrel sewer -	50 – –	
South-grove, Peckham - - -	300 feet 12-inch pipe sewer— Estimated cost - £. 40 – – Contribution to be paid 12 – –	28 – –	
York-street, Blackfriars-road -	340 feet 9-inch pipe sewer - - -	32 – –	
Northumberland-street, East Greenwich.	150 feet 12-inch pipe - - - -	20 – –	
Ravensbourne Outlet - - -	Water-way - - - - - -	200 – –	
Church-street to Lee-green - -	2,130 feet of sewer, 3 ft. 3 in. by 2 ft. 6 in.	2,000 – –	
Ravensbourne Outlet - - -	Hoarding - - - - - -	45 – –	
Ditto - - - - -	Shed and engine - - - - -	160 – –	
Weller's-place, Old St. Pancras-road	200 feet 12-inch pipe - - - -	52 10 –	
Sussex-place, Prince of Wales-road -	145 feet 12-inch pipe - - - -	44 10 –	
Suffolk-street, Borough - - -	110 feet 9-inch pipe - - - -	28 – –	
Baltic-street, St. Luke's - - -	320 feet 12-inch pipe - - - -	53 5 –	
Holloway-road, from Liverpool-road to Lorraine-place, part of Hornsey-road, Brand-street and Slaney-place.	1,620 feet of sewer, 4 ft. by 2 ft. 8 in.; 1,200 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.; 650 feet 18-inch barrel sewer.	2,055 – –	
Seaward-street, St. Luke's - -	110 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in. and 344 feet 12-inch pipe.	160 – –	
William-street, Curtain-road - -	276 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 160 feet 18-inch barrel sewer.	223 4 2	

Correspondence, &c.

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost. £.	s.	d.
John's-row, St. Luke's	740 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	450	–	–
Richard-street, Islington	400 feet 18-inch barrel sewer	94	–	–
Sebbon-street and Upper-street, Islington.	310 feet of sewer, 4 ft. by 2 ft. 8 in.	184	5	3
New Inn-yard	170 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	85	–	–
William-street, Islington	490 feet of 18-inch barrel sewer	118	–	–
Cowper-street, City-road	200 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 444 feet 18-inch barrel sewer.	228	2	2
Brunswick-street, Hackney-road	690 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 374 feet 18-inch barrel sewer.	490	–	–
New North-road, back of Compton-terrace.	950 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	515	–	–
New North-road and Canonbury-square.	400 feet of 18-inch barrel sewer	80	–	–
Essex-street and Huntingdon-street, Kingsland-road.	560 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 640 feet of 18-inch barrel sewer.	517	–	–
Cut Throat-lane, by Victoria-grove	300 feet 12-inch pipe sewer	49	–	–
Bateman-row	230 feet of sewer, 4 ft. by 2 ft. 6 in.	46	–	–
Britannia-street, City-road	900 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	540	–	–
Norris-street, Hoxton	300 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	170	–	–
Hull-street, York-road	220 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	120	–	–
Charles-street, Northampton-square	400 feet of 18-inch barrel sewer	90	–	–
Red Lion-court and Alley, College-court and Alley, Cow Cross.	760 feet 12-inch pipe	115	–	–
George-yard and adjoining courts, High-street, Islington.	400 feet 12-inch pipe	70	–	–
Glove-street and Wellington-street, Bethnal-green.	300 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	155	–	–
Wellington-street	580 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 330 feet of 12-inch pipe	550	–	–
Wellington-place	160 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 360 feet of 12-inch and 100 feet of 9-inch pipe			
Union-street and Garden-place, Bethnal-green.	260 feet 12-inch pipe	45	–	–
Cambridge-road, Bethnal-green	1,750 feet of sewer, 4 ft. 6 in. by 2 ft. 8 in.	1,500	–	–
Mape-street, Bethnal-green	846 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 600 feet 18-inch barrel sewer.	532	–	–
Primrose-street	180 feet 12-inch pipe	30	–	–
Hackney-road, from Anne's-place to Warner-street.	1,100 feet sewer; viz. 750 feet, 4 ft. by 2 ft. 6 in., and 350 feet, 3 ft. 9 in. by 2 ft. 6 in.	700	–	–
Wentworth-street and Old Montague-street, Cambridge Heath-road, by Toll-gate, Cox's-square	1,440 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in. 700 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in. 400 feet of 12-inch pipe	576 380 80	– – –	– – –
Cumberland-place and Summerford-street, Bethnal-green.	360 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	200	–	–
Cross-street, Bethnal-green	320 feet of 12-inch pipe	50	–	–
East India-road, from Upper North-street to Crisp street.	800 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	540	–	–
Glasshouse-house-street	200 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	110	–	–
Spread Eagle-street, near Limehouse	460 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	250	–	–
Princes-square, &c.	400 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in., and 1,041 feet of 18-inch barrel sewer.	485	–	–
Vincent-street	480 feet 12-inch pipe	63	–	–
Weatherhead's Gardens	380 feet 12-inch pipe	54	–	–
Bedford-lane, Stockwell	180 feet 12-inch pipe	18	–	–
Neckinger-street, Bermondsey	350 feet 9-inch pipe	33	–	–
Belvidere-road, Lambeth	240 feet 12-inch pipe— Estimated cost £. 30 – – Contribution to be paid 15 12 –	14	8	–
Hanover-street, Newington	550 feet 12-inch pipe	45	–	–
Montague-mews, South, Marylebone	150 feet 18-inch ½-brick barrel sewer	50	–	–
Pheasant-court, Gray's Inn-lane	150 feet ½-brick sewer, 3 ft. 9 in. by 2 ft. 6 in.	70	–	–
Grove-lane, Camberwell	80 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	70	–	–
York-street, Westminster	Timber used in sewer	250	–	–
Near the Hermitage, Highgate Rise	365 feet 12-inch pipe	76	15	–
Rotherhithe-street and Queen-street, from Grand Surrey Canal.	5,000 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	4,000	–	–
Boundary Ditch, from Kennington-common to Wyndham-road.	2,500 feet of ½-brick sewer, 3 ft. 9 in. by 2 ft. 6 in., and 300 feet 18-inch barrel sewer.	1,400	–	–
High-street, Lambeth	260 feet 12-inch pipe and 330 feet 9-inch pipe.	60	–	–
Garratt-lane, Tooting	3,729 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	1,500	–	–

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost. £.	s.	d.	Correspondence, &c.
Horseferry-road, Greenwich	600 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	607	–	–	
Bridge-street, ditto	600 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	450	–	–	
Porchester-gardens	300 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	195	–	–	
Bayswater	500 feet of 18-inch ½-brick barrel sewer	138	–	–	
Poplar-place	570 feet - - ditto	157	–	–	
Elizabeth-place	150 feet - - ditto	41	–	–	
Edgware-road, north of Church-street.	1,110 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	840	–	–	
Brown's-court, &c., Edgware-road	170 feet of 18-inch ½-brick barrel sewer	47	–	–	
Newcastle-place, ditto	230 feet - - ditto	63	–	–	
Titchborne-row, ditto	140 feet - - ditto	39	–	–	
Smith's-place, ditto	286 feet - - ditto	79	–	–	
Earl-street, Little, ditto	480 feet - - ditto	132	–	–	
Sawyer's court, ditto	120 feet - - ditto	33	–	–	
Malthouse-mews, ditto	148 feet - - ditto	41	–	–	
Vine-place, ditto	174 feet - - ditto	48	–	–	
North-place, ditto	120 feet - - ditto	33	–	–	
Hatton-place, ditto	100 feet 12-inch pipe	28	–	–	
Milner's-mews, ditto	160 feet of 18-inch ½-brick barrel sewer	44	–	–	
Titchborne-street, ditto	400 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	270	–	–	
Chapel-place, ditto	140 feet of 18-inch ½-brick barrel sewer	39	–	–	
Irongate Wharf, Harrow-road	320 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	204	–	–	
Bohn's-place, ditto	180 feet of 18-inch ½-brick barrel sewer	50	–	–	
Union-place, South Wharf-road	326 feet - - ditto	90	–	–	
United Buildings, Lisson-grove	190 feet - - ditto	52	–	–	
Providence-place, ditto	230 feet - - ditto	63	–	–	
Salisbury-place, ditto	230 feet - - ditto	63	–	–	
Edward's-place, ditto	146 feet - - ditto	40	–	–	
Harrow-street, ditto	224 feet - - ditto	62	–	–	
Hereford-place and Middlesex-place, ditto.	166 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	116	–	–	
Middlesex-place or Mews, ditto	110 feet of 18-inch ½-brick barrel sewer	30	–	–	
Mitcham-street, ditto	300 feet - - ditto	83	–	–	
Sutton-street, ditto	200 feet - - ditto	55	–	–	
Claremont-place, ditto	70 feet of 12-inch pipe	14	–	–	
Capland-mews, ditto	100 feet of 18-inch ½-brick barrel sewer	28	–	–	
Princess-mews, ditto	130 feet - - ditto	36	–	–	
William-street, Little, ditto	160 feet - - ditto	44	–	–	
Duke's-mews, ditto	160 feet - - ditto	44	–	–	
George-street, ditto	230 feet - - ditto	63	–	–	
William-street, ditto	380 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	263	–	–	
Devonshire-street, ditto	950 feet - - ditto	651	–	–	
Exeter-street, ditto	420 feet - - ditto	292	–	–	
Duke-street, ditto	220 feet of 18-inch ½-brick barrel sewer	61	–	–	
Salisbury-street, ditto	170 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	118	–	–	
Earl-street, ditto	900 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	618	–	–	
Sun Cottages, ditto	170 feet of 18-inch ½-brick barrel sewer	47	–	–	
Thwaite's-place, ditto	160 feet - - ditto	44	–	–	
Gwynn's-place, ditto	430 feet - - ditto	118	–	–	
Capland-street, ditto	90 feet - - ditto	25	–	–	
Capland-mews, North, ditto	110 feet - - ditto	30	–	–	
Gloucester-grove, West, Chelsea	570 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	428	–	–	
Justice-walk, ditto	160 feet of 18-inch brick barrel sewer	44	–	–	
Cheyne-row, Upper, ditto	440 feet - - ditto	121	–	–	
Cook's-ground, ditto	650 feet - - ditto	179	–	–	
Cheyne-row, ditto, and	730 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	474	–	–	
Cheyne-row, West, ditto	150 feet of 18-inch ½-brick barrel sewer	41	–	–	
Lordship's-place, ditto	180 feet - - ditto	50	–	–	
Lewer's-buildings, ditto	150 feet 12-inch pipe sewer	30	–	–	
Augustus-court, ditto	190 feet 12-inch pipe sewer	38	–	–	
Richard-place, ditto	370 feet of 18-inch ½-brick barrel sewer	102	–	–	
Green-street, ditto	300 feet - - ditto	82	–	–	
Oakley-street, ditto	1,240 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	930	–	–	
Margaretta-terrace, ditto	550 feet of 18-inch ½-brick barrel sewer	151	–	–	
Phene-street, ditto	100 feet - - ditto	27	–	–	
South Parade, ditto	600 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	360	–	–	
York-mews, ditto	370 feet of 18-inch ½-brick barrel sewer	102	–	–	
Grove Cottages, ditto	280 feet - - ditto	77	–	–	
Wellington-buildings, ditto	80 feet - - ditto	22	–	–	
Manor-street, Upper, ditto	460 feet - - ditto	127	–	–	
Rouse's-gardens, ditto	160 feet - - ditto	44	–	–	
Alpha-place, ditto	250 feet - - ditto	69	–	–	
Albert Cottages, ditto	70 feet 12-inch pipe	14	–	–	
Stein's-buildings, ditto	200 feet of 18-inch ½-brick barrel sewer	55	–	–	
Battcock's-buildings, ditto	110 feet - - ditto	30	–	–	
George-place, ditto	280 feet - - ditto	77	–	–	
Swan-walk, ditto	300 feet - - ditto	82	–	–	

Correspondence, &c.

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost. £.	s.	d.
Paradise-row, Chelsea	340 feet of 18-inch ½-brick barrel sewer	94	–	–
Calthorpe-place, ditto	340 feet - - ditto	94	–	–
Queen's-road, West, ditto	1,250 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	1,002	–	–
Bond-street, ditto	570 feet - - ditto	394	–	–
Jubilee-place, ditto	690 feet of 18-inch ½-brick barrel sewer	190	–	–
Marlborough-place, ditto	130 feet - - ditto	36	–	–
Ormes-place, ditto	130 feet - - ditto	36	–	–
Pond terrace, ditto	210 feet - - ditto	58	–	–
Oakham-street, ditto	460 feet - - ditto	127	–	–
Marlborough-square, ditto	320 feet - - ditto	88	–	–
College-street, Little, ditto	390 feet - - ditto	107	–	–
Marlborough-street, ditto	140 feet - - ditto	39	–	–
Brewer-street, ditto	100 feet - - ditto	27	–	–
Blenheim-street, ditto	880 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	572	–	–
Keppel-street, Little, ditto	130 feet of 18-inch ½-brick barrel sewer	36	–	–
Smith-street, Little, ditto	230 feet - - ditto	63	–	–
Oxford-terrace, ditto	350 feet - - ditto	96	–	–
Oxford-street, Marlborough-road, ditto.	410 feet - - ditto	113	–	–
Henry-street, ditto	270 feet - - ditto	74	–	–
Smith-street, ditto	360 feet - - ditto	100	–	–
Green-street, ditto	370 feet - - ditto	102	–	–
Lloyd's-place, Brompton	230 feet - - ditto	63	–	–
Rawstorne-mews, ditto	150 feet - - ditto	41	–	–
Peturin-place, ditto	40 feet 9-inch pipe	7	–	–
Lancelot-place, ditto	260 feet of 18-inch ½-brick barrel sewer	72	–	–
Fulham Bridge-yard, ditto	180 feet - - ditto	50	–	–
Cottage-place	150 feet - - ditto	41	–	–
Trevor-place	110 feet - - ditto	30	–	–
Park-place, Knightsbridge	240 feet 12-inch pipe	48	–	–
Knightsbridge-green	120 feet - ditto	24	–	–
Ann's-place, Knightsbridge	100 feet ditto	20	–	–
Draycott-street, Chelsea	200 feet 18-inch ½-brick barrel sewer	55	–	–
South-street, part, ditto	130 feet - - ditto	36	–	–
Exeter-buildings, ditto	230 feet - - ditto	63	–	–
New-road, Sloane-street	821 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	500	–	–
Cottage-place, Chelsea	350 feet of 18-inch ½-brick barrel sewer	96	–	–
Sloane Terrace, Sloane-street	250 feet of sewer, 3 ft. 9 in. by 2 ft. 6 in.	162	–	–
Symons-street, Lower Chelsea	560 feet of 18-inch ½-brick barrel sewer	154	–	–
Grove-place, ditto	110 feet - - ditto	30	–	–
Collett's-place, ditto	110 feet - - ditto	30	–	–
Walker's-cottages, ditto	130 feet - - ditto	36	–	–
Hooper's-court, ditto	160 feet - - ditto	44	–	–
Charles-street, ditto	220 feet - - ditto	60	–	–
Ellis-street, ditto	270 feet - - ditto	74	–	–
Earl-street, ditto	150 feet - - ditto	41	–	–
D'Oyley-street, part, ditto	210 feet - - ditto	58	–	–
Evans-buildings, ditto	210 feet - - ditto	58	–	–
George-street, Upper, ditto	210 feet - - ditto	58	–	–
George-street, Little, ditto	150 feet - - ditto	41	–	–
Union-street, ditto	100 feet - - ditto	27	–	–
Union-place, ditto	200 feet - - ditto	55	–	–
Keppel-terrace, ditto	250 feet - - ditto	69	–	–
Princes-row, West, Pimlico	170 feet - - ditto	47	–	–
Ranelagh-grove, Lower, ditto	150 feet - - ditto	41	–	–
Skinner-street	140 feet - - ditto	39	–	–
Chester-cottages, Pimlico	80 feet 12-inch pipe	16	–	–
Graham-street, West, ditto	150 feet of 18-inch ½-brick barrel sewer	41	–	–
Elizabeth-place, ditto	170 feet - - ditto	47	–	–
King-street, ditto	90 feet - - ditto	25	–	–
Clifford's-row, ditto	140 feet - - ditto	39	–	–
Kilburn-park Estate	800 feet of 8 ft. circular sewer— Estate £. 1,320 – – Contribution 400 – –	920	–	–
Salmon's-lane, Limehouse	310 feet of sewer, 2 ft. ½-brick barrel	140	–	–
Sutton-place, Upper Homerton	320 feet 12-inch pipe	63	4	–
Lawrence-buildings, Stoke Newington.	310 feet 12-inch pipe	45	2	–
From Dalston-lane to Railway	650 feet, 3 ft. 9 in. by 2 ft. 6 in.	550	–	–
Homerton-terrace	200 feet, 3 ft. 9 in. by 2 ft. 6 in., and 520 ft. 12-inch pipe— Estimate £. 244 – – Contribution 20 – –	224	–	–

LOCALITY.	DESCRIPTION OF WORK.	Estimated Cost.	Correspondence, &c.
		£. s. d	
Brunswick-street, Homerton - -	340 feet, 2 ft. ½-brick, and 230 ft. 12-inch pipe— Estimate - - £. 120 – – Contribution to be paid 33 – –	87 – –	
Gravel-lane and Holland-street, Christchurch.	1,850 feet, 3 ft. 9 in. by 2 ft. 6 in. -	3,200 – –	
Great Guildford-street, and New Park-street, St. Saviour's.	1,550 feet, 3 ft. 9 in. by 2 ft. 6 in. -		
Warwick-place, Kingsland-road -	2,978 feet of sewer, 4 ft. by 2 ft. 8 in. -	2,300 – –	
Kingsland-road from Lee-street to Canal.	680 feet, ditto, 4 ft. by 2 ft. 8 in. -		
Phillimore-place, Kensington -	1,640 feet, ditto, 3 ft. 9 in. by 2 ft. 6 in.	952 – –	
Water-street, Strand - - -	430 feet of 12-inch pipe— Estimated Cost - £. 100 – – Contribution to be paid 50 – –	50 – –	
Pell-street, Ratcliffe - - -	430 feet of 12-inch pipe - - -	60 – –	
		£. 88,204 15 8	
	Gullies, &c. - - - - -	1,775 14 6	
		£. 89,980 10 2	

SUMMARY of Sizes, Lengths, and Estimated Cost of the foregoing Works.

BRICK SEWERS.

4′ 6″ × 1′ 6″	2′ 0″ × 2′ 0″	2′ 6″ × 2′ 6″	3′ 0″ × 2′ 0″	3′ 0″ × 3′ 0″	3′ 3″ × 2′ 6″	3′ 9″ × 2′ 3″	3′ 9″ × 2′ 6″	4′ 0″ × 2′ 6″	4′ 0″ × 2′ 8″	4′ 0″ × 2′ 9″	4′ 0″ × 4′ 0″	4′ 6″ × 3′ 0″	4′ 6″ × 3′ 6″	8′ 0″ × 8′ 0″	Total Length.
Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	
32,108	650	150	130	700	2,130	330	67,299	3,654	11,358	160	2,653	1,400	150	800	123,672 feet, equal to 23 miles, 2,232 feet

PIPE SEWERS.						Total Length of Brick and Pipe Sewers.	Length of open Sewers covered in.	Total Expense of Brick and Pipe Sewers and covering over and open Sewers.	Expense of constructing Gullies, Ventilating Shafts, and of Miscellaneous Works.	Grand Total Cost of Sewers, Covering open Sewers, Gullies, Ventilating Shafts and Miscellaneous Works.	Amount reserved for further Works not yet fully considered, and for Contingencies.	Total available Balance.
4	6″	9″	12″	15″	Total Length.							
								£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
31	776	5,653	30,077	790	37,327 feet, equal to 7 miles, 367 feet	160,999 feet, equal to 30 miles, 2,599 feet	1,028	87,047 15 8	2,932 14 6	89,980 10 2	44,683 6 1	134,663 16 3

Enclosure, No. 3, in No. 6.

FINANCIAL ESTIMATE of the Amount of AVAILABLE BALANCE for EXTRAORDINARY WORKS in the several DISTRICTS for the ensuing Year, after providing for the Current Ordinary EXPENDITURE of the COMMISSION.

DISTRICTS, &c.	Present State of the Funds in each District.		Amount derivable from Uncollected Rates.	Available Balance, after taking Credit for Amount to be derived from Outstanding Rates now in Collection.		Amount to be raised by New Rates.	Available Balance after making New Rates.		Amount of ordinary Expenditure per Annum.	Available Balance for Extraordinary Works.	
	Credit.	Debt.		Credit.	Debt.		Credit.	Debt.		Credit.	Debt.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Counter's Creek District	—	931 9 4	100 — —	—	831 9 4	5,000 — —	4,168 10 8	—	1,220 8 1	2,948 2 7	—
Ranelagh District	3,121 19 —	—	8,500 — —	11,621 19 —	—	22,090 — —	33,621 19 —	—	3,905 19 7	29,715 19 5	—
Ditto, Bayswater Sewer	—	360 4 11	300 — —	—	60 4 11	—	—	60 4 11	196 — —	—	256 4 11
Western Division of Westminster Sewers	—	12,398 4 6	—	—	12,398 4 6	18,000 — — prepared at 3 *d.*	5,601 15 6	—	7,042 13 9	—	1,440 18 3
Regent-street, &c. District	—	2,018 19 11	1,500 — —	—	518 19 11	5,000 — —	4,481 — 1	—	634 11 —	3,846 9 1	—
Eastern Division of Westminster Sewers	—	6,109 17 8	200 — —	—	5,909 17 8	20,000 — —	14,090 2 4	—	3,707 10 1	10,382 12 3	—
Holborn Division	—	2,311 3 8	2,000 — —	—	311 3 8	20,000 — —	19,688 16 4	—	4,020 10 4	15,668 6 —	—
Finsbury Division	205 19 9	—	2,000 — —	2,205 19 9	—	22,000 — —	24,205 19 9	—	4,196 6 6	20,009 13 3	—
Spitalfields, &c. Level	—	7,688 5 6	1,000 — —	—	6,688 5 6	16,000 — —	9,311 14 6	—	3,356 16 6	5,954 18 —	—
Hackney Brook Level	—	1,187 10 3	200 — —	—	987 10 3	3,000 — —	2,012 9 9	—	763 17 —	1,248 12 9	—
Lower Wapping Level	—	1,035 12 7	20 — —	—	1,015 12 7	900 — —	—	115 12 7	336 12 1	—	452 4 8
Limehouse Level	—	547 4 8	10 — —	—	537 4 8	300 — —	—	237 4 8	122 12 4	—	359 17 —
Upper Limehouse Level	24 — 7	—	20 — —	44 — 7	—	200 — —	244 — 7	—	50 4 9	193 15 10	—
Tower Hill Level	—	375 19 9	10 — —	—	365 19 9	300 — —	—	65 19 9	34 6 10	—	100 6 7
Hermitage-street Level	—	53 16 7	10 — —	—	43 16 7	430 — —	386 3 5	—	72 1 9	314 1 8	—
St. Katharine's District	—	36 18 5	—	—	36 18 5	—	—	36 18 5	33 8 6	—	70 6 11
Poplar and Blackwall District	—	1,890 9 5	—	—	1,890 9 5	2,000 — —	109 10 7	—	901 6 1	—	791 15 6
Surrey and Kent District	—	17,789 14 3	3,000 — —	—	14,789 14 3	36,000 — —	21,210 5 9	—	14,978 — 10	6,232 4 11	—
Greenwich District	—	1,380 8 10	400 — —	—	980 8 10	3,400 — —	2,419 11 2	—	1,017 13 2	1,401 18 —	—
Wandle District	—	169 5 9	50 — —	—	119 5 9	1,400 — —	1,280 14 3	—	202 7 8	1,078 6 7	—
Fulham and Hammersmith District	—	601 5 10	60 — —	—	541 5 10	2,400 — —	1,858 14 2	—	1,012 5 11	846 8 3	—
Ravensbourne District	—	157 18 4	10 — —	—	147 18 4	2,000 — —	1,852 1 8	—	450 10 6	1,401 11 2	—
Richmond District	—	1,172 2 10	150 — —	—	1,022 2 10	900 — —	—	122 2 10	183 7 —	—	305 9 10
Mortlake District	—	64 13 9	—	—	64 13 9	—	—	64 13 9	—	—	64 13 9
Kew District	—	19 6 6	—	—	19 6 6	—	—	19 6 6	—	—	19 6 6
Putney District	—	60 4 6	—	—	60 4 6	—	—	60 4 6	—	—	60 4 6
Barnes District	—	21 14 7	—	—	21 14 7	—	—	21 14 7	—	—	21 14 7
Latchmere Division	—	35 1 9	—	—	35 1 9	—	—	35 1 9	—	—	35 1 9
Kingston Division	—	19 17 4	—	—	19 17 4	—	—	19 17 4	—	—	19 17 4
Brent	—	274 11 10	—	—	274 11 10	—	—	274 11 10	—	—	274 11 10
Bow and Bromley	—	279 13 5	—	—	279 13 5	—	—	279 13 5	26 16 2	—	306 9 7
£.	3,351 19 4	58,991 16 8	19,540 — —	13,871 19 4	49,971 16 8	181,230 — —	146,543 9 6	1,413 6 10	48,466 6 5	101,242 19 9	4,579 3 6
	3,351 19 4			13,871 19 4			1,413 6 10			4,579 3 6	
	Debt £.	55,639 17 4		Debt £.	36,099 17 4	Credit £.	145,130 2 8	Balance available for Extraordinary Works £.		*96,663 16 3	

The above Statement does not embrace the following Liabilities, viz.—

	£. s. d.
Permanent Loans	80,423 — —
Claim for Ordnance Survey	24,212 17 5
£.	104,635 17 5

* The above available Balance has since been increased by the following Amounts:

Western Division of Westminster Sewers, additional Amount to be derived from 6 *d.*, instead of 3 *d.* rate	18,000 — —
New Loan from Royal Exchange Assurance Company { Western Division of Westminster, 15,000 *l.* / Surrey and Kent District - - 5,000 *l.* }	20,000 — —
£.	134,663 16 3

Principal Office, Greek-street, Soho-square, July 1852.

G. S. Hatton, Accountant.

Enclosure, No. 5, in No. 6.

ABSTRACT of the CASH ACCOUNTS of the COMMISSION, from 5 January 1849 to 24 July 1852.

	1849, from 5 January.	1850.	1851.	1852, to 24 July.	TOTAL 3½ Years.
RECEIPTS, &c.:	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Cash Balance, 5 January 1849 -	22,956 3 7	- - -	- - -	- - -	22,956 3 7
District Rates - - - - -	55,105 3 –	77,748 6 6	96,621 6 –	44,515 14 7	273,990 10 1
Contributions from private parties, including Improvement Rates and Charges for Defaults.	13,518 10 10	13,322 – 5	11,148 2 10	4,619 19 10	42,608 13 11
Loans, &c. - - - - - -	3,000 – –	- - -	21,330 11 11	10,701 5 11	35,031 17 10
TOTAL RECEIPTS - - £.	94,579 17 5	91,070 6 11	129,100 – 9	59,837 – 4	374,587 5 5
EXPENDITURE:					
Works - - - - - -	50,309 4 1	57,655 6 4	95,939 19 3	46,760 7 1	250,664 16 9
Surveys - - - - - -	8,339 19 10	8,618 10 3	6,332 19 9	1,665 8 9	24,956 18 7
Management - - - - -	22,400 17 5	21,104 17 10	16,430 9 2	6,009 6 –	65,945 10 5*
Loans, &c. - - - - - -	4,014 12 8	4,187 4 6	10,042 10 2	2,827 13 5	21,072 – 9
Contingencies - - - - - (This item includes Law Charges, Retiring Allowances, &c.)	280 9 6	2,988 12 –	2,749 1 1	1,567 10 11	7,585 13 6
TOTAL PAYMENTS - - £.	85,345 3 6	94,554 10 11	131,494 19 5	58,830 6 2	370,225 – –
Cash Balance, 24 July 1852 - - - - - -					4,362 5 5
				£.	374,587 5 5

* Expenses of Management may be thus distributed:—

	£. s. d.	
District Rates collected during this period of nearly 3 years and 7 months - -	273,990 10 1	
Contributions, including Improvement Rates and Charges for Default - -	42,608 13 11	
(1.) Five per cent.; estimated cost of making and collecting Rates (total collected) - - - - - - - - - - - - - -	316,599 4 –	15,829 19 2
Value of works executed in above period at public expense - - -	234,226 11 7	
(2.) Cost of designing and superintending execution of them at 5 per cent. -	- - -	11,711 6 6
Value of Private Works executed under superintendence of Commission in 1850 and 1851 - - - - - - - - - - - - -	123,955 17 4	
Ditto, in 1849 and 1852 (to July 24), estimated on average of 1850 and 1851,—say - - - - - - - - - - - - -	97,100 – –	
(3.) 4 per cent., Cost of superintending private works - - - - - -	221,055 17 4	8,842 – –
(4.) Remaining, as expense of General Management, being at annual rate of £. 8,314. 7. 7. - - - - - - - - - - - - -	- - -	29,562 4 9
TOTAL EXPENSES of MANAGEMENT, as above - - - £.		65,945 10 5

(signed) *G. S. Hatton*,
Accountant.

Enclosure, No. 6, in No. 6.

WORKS executed at the PUBLIC EXPENSE.

	1849.	1850.	1851.	1852, to 24 July.	TOTAL.
	Miles. ft.	*Miles. ft.*	*Miles. ft.*	*Miles. ft.*	*Miles. ft.*
Brick sewers	0 5,031	5 4,004	9 5,249	0 662	16 4,386
Pipe sewers	9 2,525	16 607	23 1,417	2 2,248	51 1,517
TOTAL	10 2,276	21 4,611	33 1,386	2 2,910	68 623

COST of WORKS executed at the PUBLIC EXPENSE.

NEW WORKS:	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Sewers, as above	12,792 6 4	38,439 13 9	60,822 17 4	2,258 1 3	114,312 18 8
Side entrances, gullies and other openings.	5,577 9 6	6,203 10 4	11,695 16 6	2,307 13 7	25,784 9 11
Urinals	- - -	- - -	571 9 3	- - -	571 9 3
Incidental works, compensation for private property used or injured, &c.	1,560 2 9	2,296 – 5	9,376 15 8	649 4 7	13,882 3 5
Making good roads	452 11 5	497 11 6	326 7 1	Included in cost of constructing sewers	1,276 10 –
MAINTENANCE:					
Repairs	3,046 11 5	4,550 13 7	6,286 19 2	2,331 17 –	17,116 1 2
Cleansing, &c.	18,595 18 10	17,523 14 7	17,559 10 7	7,603 15 2	61,282 19 2
TOTAL £.	42,925 – 3	69,511 4 2	106,639 15 7	15,150 11 7	234,226 11 7

WORKS executed at Cost of PRIVATE PARTIES under Superintendence of COMMISSION.

	1849.	1850.	1851.	1852, to 24 July.	TOTAL.
	Miles. ft.	*Miles. ft.*	*Miles. ft.*	*Miles. ft.*	*Miles. ft.*
Brick sewers	No account kept.	6 339	9 1,046	No return yet	15 1,385
Pipe sewers and drains		45 2,141	82 1,413	About the average of 1850 and 1851	127 3,554
TOTAL	- - -	51 2,480	91 2,459	- - -	142 4,939

COST of the above PRIVATE WORKS, including Side Entrances, &c.

	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
TOTAL £.	- - -	46,186 19 7	77,768 17 9	- - -	123,955 17 4

(signed) *Wm. Lavers,*
Clerk of Surveyors' and Contractors' Accounts.

Enclosure, No. 7, in No. 6.

APPROXIMATE ESTIMATE of Amount available for New Works in next Six Years, derivable from a Sixpenny Rate, with the Aid of Loans under amended borrowing Powers.

About eight times the amount of the Income derivable from the Rates may safely be borrowed on the security of the Rates.

The money borrowed may be repayable, with interest at 4 per cent., in the form of an equal Annuity for 30 years. On these terms an Annuity of about £. 5. 8. would be required for every £. 100 borrowed.

The Income derivable from a Sixpenny Rate in all the Districts North of the Thames amounts to - £. 155,530 8

Amount which may be borrowed on that Income - - - - - £. 1,244,240

Or say - - £. 1,200,000.

Annuity for 30 years required to discharge that Debt - - - - £. 69,600

Income from a Sixpenny Rate on Districts South of Thames - - - - - - £. 43,700 8

Amount which may be borrowed - - - - - - - - £. 349,600

Say - - £. 350,000.

Annuity for 30 years required to discharge that Debt - - - - £. 20,300

	North of Thames.	South.	Total.
	£. s. d.	£. s. d.	£. s. d.
Annuities required to pay off proposed Loans - -	69,600 – –	20,300 – –	89,900 – –
Ordinary Expenditure for Maintenance of Sewers and Establishment, but exclusive of Interest on present Debts (to be paid off out of new Loans) - - -	30,865 – –	12,248 – –	43,113 – –
* Balance of Income available for New Works - -	55,065 – –	11,152 – –	66,217 – –
Total Income from Sixpenny Rate - - £.	155,530 – –	43,700 – –	199,230 – –
* Available Balances of Six Years - - - - -	330,390 – –	66,912 – –	397,302 – –
New Loans, as above - - - - - - -	1,200,000 – –	350,000 – –	1,550,000 – –
Gross Total - - - £.	1,530,390 – –	416,912 – –	1,947,302 – –
Deduct old Debts to be paid off - - -	18,525 – –	81,088 – –	99,613 – –
Net Total applicable to New Works - £.	1,511,865 – –	335,824 – –	1,847,689 – –

Note.—As the new loans would not be all contracted at once, but by instalments as required, the amount available for new works would be slightly increased for the first few years by the difference between the annuities actually required in those years and the amount stated in the Estimate.

There would be also some addition to the income arising from (1.) Annual increase of produce of sixpenny rate proportionate to the annual advance in value of rateable property; (2.) Contributions from private parties, estimated at £. 12,000 a year.

On the other hand, the execution of extensive new works would increase the annual cost of maintenance and establishment.

As a set-off against these increased charges, as well as to provide for contingencies, the addition from the preceding sources is omitted in the Estimate.

Correspondence, &c.

No. 7.

H. Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 5 March 1853.

Viscount Palmerston having received from the Auditor an abstract of the accounts of the Metropolitan Commission of Sewers for the year 1852, from which it appears that the sum expended for works during the year was 85,790*l.* 19*s.*, I am directed by his Lordship to request that you will furnish him with a statement of the particulars of this expenditure on works, for his information.

I am, &c.
(signed) *H. Waddington.*

No. 8.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 7 March 1853.

In reply to your letter of the 5th instant, conveying to me Lord Palmerston's directions to furnish his Lordship with a statement of the particulars of the expenditure of a sum of 85,790*l.* 19*s.* on works by the Metropolitan Commissioners of Sewers in the year 1852, I beg to say that I have ordered the statement in question to be prepared forthwith, and that I hope to be able to furnish it in the course of a few days.

I am, &c.
(signed) *Richard Jebb.*

No. 9.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 8 March 1853.

I am directed by Viscount Palmerston to transmit for your consideration an extract of a letter from Mr. Richard Barrett, suggesting a plan for preventing the effluvia being emitted through the gratings of the common sewers.

I am, &c.
(signed) *H. Waddington.*

Enclosure in No. 9.

Extract.

I beg leave to suggest, for your Lordship's consideration, a plan for preventing the effluvia being emitted through the gratings of the common sewer, which has now become so great a nuisance as to render many of the dwelling-houses in London little better than hot-beds of disease.

The remedy I propose is one recommended by W. Oatley & Son, plumbers, 25, Aldermanbury, City, and is simply that of continuing all the rain-water pipes now attached to every building under the pavement into the common sewer, which would have the effect of withdrawing all the deleterious vapour from the sewers, and be the means of conveying them into the air, at such an altitude as to render them harmless.

32, Brudenell-place, Hoxton. (signed) *Rd. Barrett.*

No. 10.

No. 10.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 9 March 1853.

I BEG to acknowledge the receipt of your letter, transmitting, by direction of Lord Palmerston, an extract of a letter from Mr. Richard Barrett, suggesting a plan for preventing the escape of effluvia through the gratings of the sewers, and to inform you that the proposed plan shall be submitted to the Metropolitan Commissioners of Sewers.

I am, &c.

(signed) *Rich^d^ Jebb.*

No. 11.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 17 March 1853.

IN compliance with the directions conveyed to me in your letter of the 5th instant, I have the honour to forward to you, for the information of Viscount Palmerston, a statement of the particulars of the expenditure by the Metropolitan Commissioners of Sewers of a sum of 85,790 *l.* 19 *s.*, being the amount expended by them for works in the year 1852, as appearing in the abstract of the accounts of the Commission for that year. Enclosure No. 1.

The above-mentioned sum was the amount actually paid in the year 1852 for works, a large portion of which, however, was executed in the preceding year. As possibly Viscount Palmerston may desire to know what works were actually executed by the Commissioners during the same year 1852, I beg to enclose, for his Lordship's further information, a detailed statement of such works, with their cost. Enclosure No. 2.

I have, &c.

(signed) *R. Jebb.*

Enclosure, No. 1, with No. 11.

SUMMARY.

DISTRICTS, &c.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
	Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
	Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Counter's Creek District	870	1,118	938 1 10	212 19 2	471 7 4	422 7 4	2,044 15 8
Ranelagh District	1,762	4,266	2,368 12 10	350 10 7	1,449 17 4	878 7 8	5,047 8 5
Western Division, Westminster Sewers	1,906	2,574	4,208 10 2	1,031 17 4	1,852 10 6	4,520 14 4	11,613 12 4
Regent-street, &c. District	-	-	360 1 –	45 – 11	285 16 7	170 5 6	861 4 –
Eastern Division, Westminster Sewers	2,212	5,246	5,355 4 8	220 10 11	1,471 11 3	2,389 5 1	9,436 11 11
Holborn Division	7,525	4,847	6,159 9 8	371 9 4	856 7 4	719 4 6	8,106 10 10
Finsbury Division	9,222	2,390	5,148 4 8	393 8 4	1,155 17 9	1,081 3 –	7,778 13 9
Spitalfields, &c. Level	3,841	6,180	4,714 1 1	960 16 2	2,528 18 7	602 16 –	8,806 11 10
Hackney Brook Level	2,544	2,667	1,487 11 1	169 13 –	360 11 10	101 14 3	2,119 10 2
Lower Wapping Level	-	-	29 14 9	57 1 11	212 8 4	49 6 6	348 11 6
Limehouse Level	-	-	16 6 9	43 3 7	229 8 10	10 1 11	299 1 1
Upper Limehouse Level	-	-	– 10 –	38 13 8	5 5 10	6 10 2	50 19 8
Tower Hill Level	390	-	258 14 10	30 18 4	1 6 3	12 19 1	303 18 6
Hermitage-street Level	-	-	1 12 –	21 19 5	24 19 11	9 14 8	58 6 –
St. Katherine's District	-	-	-	-	-	6 13 7	6 13 7
Poplar and Blackwall District	53	520	125 15 7	122 8 6	359 6 3	96 8 4	703 18 8
Surrey and Kent District	2,067	39,765	8,773 18 10	1,596 9 5	4,482 8 4	2,034 15 1	16,887 11 8
Greenwich District	3,412	3,627	2,884 4 2	204 9 11	115 3 4	335 12 9	3,539 10 2
Wandle District	-	-	2 18 –	25 4 –	43 4 11	42 9 10	113 16 9
Fulham and Hammersmith District	173	882	325 8 8	33 6 1	379 4 6	193 6 –	931 5 3
Ravensbourne District	5,500	1,392	5,409 19 10	14 – 11	12 12 6	196 8 9	5,633 2 –
Richmond District	-	10,671	896 4 4	44 14 6	86 9 8	60 2 3	1,087 10 9
Mortlake District	-	-	-	-	-	– 8 8	– 8 8
Barnes District	-	-	-	-	-	– 4 4	– 4 4
Bow and Bromley	-	-	2 15 –	– 18 2	1 16 11	5 11 5	11 1 6
TOTAL £.	(a) 41,477	(a) 86,145	49,467 19 9	5,989 14 2	16,386 14 1	(b) 13,946 11 –	85,790 19 –

(a) Where instalments have been paid on account of new sewers in progress, and not completed, a corresponding length only is shown in these columns.

(b) This amount includes the following items of Expenditure; viz.

For Supervision of Works	£. 6,446 9 4
For Compensation	4,595 9 4

(signed) *Wm. Lavers*,
Clerk of Surveyors' and Contractors' Accounts.

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
COUNTER'S CREEK -	Weller-street - - -	brick sewer, &c. - -	606	- -	300 - -	- - -	- - -	- - -	300 - -
	Gunter's-grove - -	6 new gullies - -	- -	- -	7 3 3				
	Riley-street - - -	2 - ditto - - -	- -	- -	2 7 9				
	King's-road - - -	- - - - -	- -	- -	- 14 6				
	Millman's-row - -	1 air shaft - - -	- -	- -	- 9 10				
	Gunter's-grove - -	1 new gully - -	- -	- -	- 11 6				
	Devonshire-place - -	1 - ditto - - -	- -	- -	1 3 10				
	Edith-grove - - -	2 - ditto - - -	- -	- -	2 7 9				
	Walham-green - -	5 - ditto - - -	- -	- -	13 7 3				
	Various localities - -	private drains, &c. -	- -	- -	19 1 6	55 1 4	117 8 2	11 6 10	231 3 6
	Ditto - - - -	- ditto - - -	- -	- -	1 13 -	9 10 1	7 10 6	- 10 6	19 4 1
	Portland-place - -	2 side entrances, &c. -	- -	- -	7 11 10				
	New Brompton - -	6 new gullies - -	- -	- -	7 14 -				
	Albert-street - - -	2 - ditto - - -	- -	- -	2 3 9				
	Wharf-road, Notting-hill	2 - ditto - - -	- -	- -	2 13 9				
	Victoria-road - -	1 - ditto - - -	- -	- -	1 10 8				
	Elbrook Sewer - -	arching over - -	226	- -	34 8 6				
	Edith-grove - - -	2 new gullies - -	- -	- -	18 3 8				
	Victoria-place - -	1 - ditto - - -	- -	- -	5 18 5				
	Kensall New Town -	pipe sewer - - -	- -	90	16 14 5				
	Holywood-grove - -	1 new gully - -	- -	- -	4 2 6				
	Moscow-road - -	pipe sewer - - -	- -	70	10 14 9				
	Ladbroke-grove - -	pipe sewer, &c. - -	- -	200	47 13 2				
	Various localities - -	private drains, &c. -	- -	- -	21 19 11	17 15 -	72 11 3	24 5 9	296 1 4
	Portland-road - -	1 air shaft - - -	- -	- -	- 9 4				
	Portobello-lane - -	brick sewer - -	38	- -	15 17 10				
	Wood-lane - - -	pipe sewer - - -	- -	14	2 16 2				
	Uxbridge-road - -	- ditto - - -	- -	86	15 5 8				
	East Crescent-mews -	3 new gullies - -	- -	- -	10 2 9				
	Pembridge-mews - -	3 - ditto - - -	- -	- -	8 11 -				

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Counter's Creek—*cont^d* -	Pottery-lane - - -	4 new gullies - -	- -	- -	19 3 11				
	William-street - -	1 - ditto - - -	- -	- -	3 15 7				
	James-street - - -	2 - ditto - - -	- -	- -	7 17 7				
	John's-terrace - -	3 - ditto - - -	- -	- -	13 5 11				
	Clarendon-road - -	1 - ditto - - -	- -	- -	4 19 –				
	Various localities - -	private drains, &c. -	- -	- -	18 16 –	25 13 9	86 19 7	13 8 –	
									247 2 1
	Kensington Park-crescent	1 new gully - -	- -	-	4 9 10				
	North-street - - -	4 - ditto - - -	- -	- -	13 – 5				
	St. James-square - -	4 - ditto - - -	- -	- -	7 6 5 7 11 3				
	Pembridge Villa-road -	1 - ditto - -	- -	- -	4 5 3				
	Kensington Park-terrace	2 - ditto - -	- -	- -	11 5 9				
	Drayton-grove - -	1 - ditto - -	- -	- -	4 16 4				
	Lindsey-place - -	pipe sewer - -	- -	48	6 12 5				
	Pembroke-road - -	2 new gullies - -	- -	- -	12 12 –				
	Kensington Park-road -	2 - ditto - - -	- -	- -	8 5 9				
	Various localities - -	private drains, &c. -	- -	- -	31 6 10	41 4 –	137 17 9	25 7 3	
									316 1 3
	South-row - - -	1 new gully - -	- -	- -	3 5 11				
	Drayton-grove - -	2 - ditto - - -	- -	- -	8 8 6				
	High-street, Notting-hill -	1 - ditto - - -	- -	- -	6 6 4				
	Park-walk - - -	2 - ditto - - -	- -	- -	5 4 11				
	High-row, Kensall-green	pipe sewer - - -	- -	610	53 19 8				
	Ladbroke-road - -	1 side entrance - -	- -	- -	25 18 2				
	Camden-house Estate -	6 new gullies - -	- -	- -	31 10 2				
	Various localities - -	private drains, &c. -	- -	- -	40 5 8	63 15 –	47 16 9	29 16 4	
									316 7 5
	Ditto - - - -	sluice and flap-keepers	- -	- -	- - -	- - -	- - -	65 – –	
									65 – –
	Ditto - - - -	supervision, &c - -	- -	- -	- - -	- - -	1 3 4	252 12 8	
									253 16 –
			870	1,118					£. 2,044 15 8

RANELAGH - -	Caversham-street - -	pipe, sewer, gullies, &c.	- -	1,457	295 11 10				
	Great James-street and Chapel-street.	brick sewer - -	370	- -	106 6 8	—	—	—	401 8 6
	Church-street - -	1 air shaft - - -	- -	- -	- 8 10				
	Blomfield-crescent - -	2 new gullies - -	- -	- -	12 9 11				
	Wellington-street - -	2 - ditto - - -	- -	- -	7 18 7				
	Sumner-place - -	6 - ditto - - -	- -	- -	25 8 -				
	Symond's-street - -	pipe sewer - - -	- -	222	45 4 5				
	Westbourne-street - -	- ditto - - -	- -	100	18 3 6				
	Kimbolton-place - -	1 new gully - -	- -	- -	1 1 4				
	Various localities - -	private drains, &c. -	- -	- -	73 5 7	78 6 10	191 16 9	100 7 1	554 10 10
	Ditto - - - -	cleansing, &c. - -	- -	- -	- - -	- - -	296 10 11	—	296 10 11
	Ditto - - - -	private drains, &c. -	- -	- -	4 10 -	4 8 10	16 3 6	- 14 -	25 16 4
	Harrow-road - - -	4 new gullies - -	- -	- -	2 13 10				
	South-street, Chelsea -	pipe sewer - - -	- -	106	22 4 6				
	Minerva-street - -	- ditto - - -	- -	134	23 13 -				
	Doyley-street - - -	- ditto - - -	- -	204	38 2 6				
	Brook-mews - - -	2 new gullies - -	- -	- -	6 2 11				
	Dudley-street - -	3 - ditto - - -	- -	- -	19 4 10				
	Craven-hill - - -	2 - ditto - - -	- -	- -	10 3 7				
	Inverness-terrace - -	2 - ditto - - -	- -	- -	10 15 7				
	Blomfield-road - -	1 - ditto - - -	- -	- -	6 6 3				
	Kilburn, by Brewery -	brick sewer - -	297	- -	139 7 7				
	Grosvenor-cottages -	1 new gully - -	- -	- -	4 2 6				
	Craven-hill - - -	1 - ditto - - -	- -	- -	3 13 10				
	Emperor-terrace - -	1 - ditto - - -	- -	- -	9 4 3				
	Cumberland-street - -	brick sewer, &c. - -	675	- -	165 15 10				
	Lavender-place - -	pipe sewer, &c. - -	- -	414	59 1 10				
	Clifton-road - - -	1 new gully - -	- -	- -	3 4 2				
	Finchley-road - -	1 air shaft - - -	- -	- -	2 1 10				
	Wellington-street - -	pipe sewer - - -	- -	212	28 5 3				
	Caroline-place - -	- ditto - - -	- -	178	25 14 9				
	Selwood-place - -	pipe sewer and gullies -	- -	284	47 15 9				
	Finchley-road - -	brick sewer - -	240	- -	142 19 6				
	Knightsbridge - -	urinal - - -	- -	- -	18 10 -				
	Various localities - -	private drains, &c. -	- -	- -	73 15 6	71 3 2	240 18 7	19 14 10	1,194 16 2
	7 & 8, Orme's-square -	improvement works -	- -	- -	34 12 7				
	6a, Edgware-road - -	- ditto - - -	- -	- -	7 13 6 10 16 7				
	9, Hardington-street -	- ditto - - -	- -	- -	4 17 1				
	2, Oxford-terrace - -	- ditto - - -	- -	- -	15 15 -				
	13 and 14, Gray's-place -	- ditto - - -	- -	- -	28 14 11				
	2, 3 and 4, Westbourne-street.	- ditto - - -	- -	- -	29 5 1	—	—	—	131 14 9

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
RANELAGH—*continued*	Princes-gate	3 new gullies	–	–	12 1 5				
	Wellington-square	7 - ditto	–	–	30 12 9				
	Smith's-terrace	2 - ditto	–	–	9 4 6				
	Chapel-place	1 - ditto	–	–	3 19 –				
	Onslow-crescent	4 - ditto	–	–	10 13 –				
	Winchester-row	1 - ditto	–	–	3 – 8				
	Abbey-road	2 - ditto	–	–	7 19 5				
	Orsett-street	3 - ditto	–	–	17 8 7				
	Charles-street, Paddington	1 - ditto	–	–	3 19 –				
	Various localities	private drains, &c.	–	–	33 19 4	52 6 11	187 12 –	19 11 3	392 7 10
	Clifton-road	1 side entrance, &c.	–	–	3 6 –				
	Hereford-square	3 new gullies	–	–	11 7 3				
	Ranelagh-grove	1 - ditto	–	–	3 15 7				
	Gloster-grove	6 - ditto	–	–	6 15 1				
	Clough's Cottages	1 - ditto	–	–	1 2 6				
	Vincent-street	2 - ditto	–	–	1 6 11				
	Charlton-road	2 - ditto	–	–	11 14 3				
	Manor-street	pipe sewer and gullies	–	639	139 9 7				
	Lyon's-mews	1 new gully	–	–	9 8 6				
	Pickering-mews	1 - ditto	–	–	6 12 2				
	James-place	6 - ditto	–	–	24 13 7				
	Westbourne-terrace	1 - ditto	–	–	4 10 1				
	Bark-place	1 - ditto	–	–	1 3 –				
	Gloster-terrace	8 - ditto	–	–	42 11 –				
	Delamere-street	3 - ditto	–	–	23 13 3				
	Paddington-green	1 air shaft	–	–	2 19 6				
	Wilton-crescent	1 new gully	–	–	3 9 4				
	Montpelier-square	1 - ditto	–	–	3 19 7				
	Cheyne-walk	2 - ditto	–	–	11 13 1				
	Oxford-square	1 air shaft	–	–	3 8 –				
	Portsdown-place	2 new gullies	–	–	8 3 11				
	Various localities	private drains, &c.	–	–	56 8 7	61 12 3	279 3 8	14 6 7	736 13 4

	Upper Ebury-street -	3 air shafts - - -	- -	- -	- 19 3						
					- 15 10						
					- 17 8						
	Grosvenor-row - -	1 - ditto - - -	- -	- -	- 16 9						
	Upper Ebury-place -	1 - ditto - - -	- -	- -	- 16 9						
	Queen-street - - -	1 - ditto - - -	- -	- -	- 19 4						
	Harrow-road - - -	1 - ditto - - -	- -	- -	- 8 10						
	Devonshire-terrace -	2 new gullies - -	- -	- -	8 2 5						
	Hamilton-terrace - -	1 - ditto - - -	- -	- -	3 11 6						
	Hyde Park Gardens Mews	pipe sewer - - -	- -	68	10 19 9						
	Portsdown-road - -	2 new gullies - -	- -	- -	9 5 1						
	Warwick-court - -	6 - ditto - - -	- -	- -	21 15 6						
	Chichester-street - -	1 - ditto - - -	- -	- -	4 10 8						
	Westbourne-terrace -	2 - ditto - - -	- -	- -	17 6 1						
	Randolph-road - -	1 - ditto - - -	- -	- -	8 17 5						
	Kilburn, by Brewery -	pipe sewer - - -	- -	176	28 12 9						
	Frognal, Hampstead -	brick sewer - -	180	- -	42 6 8						
	Cheltenham-terrace -	1 air shaft - - -	- -	- -	1 13 9						
	James-street - - -	pipe sewer and gullies -	- -	72	30 3 5						
	Thurloe-place, West -	1 air shaft - - -	- -	- -	1 14 8						
	Warwick-road - -	1 new gully - -	- -	- -	6 12 1						
	Carlysle-street - -	1 side entrance - -	- -	- -	16 9 -						
	Crescent-place - -	1 air shaft - - -	- -	- -	1 - 8						
	Eaton-place - - -	1 - ditto - - -	- -	- -	1 - 10						
	King's-road - - -	1 - ditto - - -	- -	- -	1 17 3						
	Various localities - -	private drains, &c. -	- -	- -	47 7 5	82 12 7	226 7 11	19 11 7		597 13 5	
	Ditto - ditto - -	flap-keepers, &c. - -	- -	- -	- - -	- - -	- - -	65 - -		65 - -	
	Ditto - ditto - -	supervision, &c. - -	- -	- -	- - -	- - -	- - -	635 7 10		635 7 10	
	Hampstead - - -	Powell, cleansing pond	- -	- -	- - -	- - -	11 4 -	—		11 4 -	
	Advertisements - -	for tenders - - -	- -	- -	- - -	- - -	- - -	3 14 6		3 14 6	
			1,762	4,266	- - -	- - -	- - -	- -	£.	5,047 8 5	
WESTERN - - -	Victoria-road, St. James -	brick sewer, &c. - -	356	- -	1,126 8 5						
	Tothill-street - - -	- ditto - - -	980	- -	1,349 17 8						
	New-street, Vincent-square	brick sewer - -	230	- -	72 2 8	—	—	—		—	
	Various localities - -	private drains, &c. -	- -	- -	5 16 -	7 15 8	- 19 -	- 3 4		2,548 8 9	
	Carlisle-street - -	1 new gully - -	- -	- -	5 4 3					14 14 -	
	Ashley-place - - -	1 - ditto - - -	- -	- -	5 4 3						
	Great Ryder-street -	brick sewer and gully -	200	- -	92 14 6						
	Mason's-yard - -	pipe sewer - - -	- -	339	58 8 -						
	Caledonia-street - -	1 new gully - -	- -	- -	5 3 8						

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
WESTERN—*continued*	Hugh-street	1 air shaft	-	-	4 15 2				
	Thames-parade	pipe sewer	140	-	26 9 2				
	Cambridge-street	1 air shaft	-	-	4 15 2				
	Hugh-street	1 new gully	-	-	5 – 7				
	St. Alban's-terrace	1 - ditto	-	-	5 19 11				
	Vauxhall-road	1 - ditto	-	-	5 10 3				
	Brewer-street	1 air shaft	-	-	3 4 6				
	Bridge-street, Westminster	2 new gullies	-	-	17 16 7				
	Dean-street, Westminster	1 - ditto	-	-	4 6 1				
	Horse and Groom-yard	1 - ditto	-	-	5 14 7				
	Britannia-gardens	pipe sewer	-	236	35 19 11				
	Caledonia-street	1 new gully	-	-	5 10 3				
	Bulstrode-mews	pipe sewer and 2 gullies	-	246	54 3 1				
	Brewer-street	1 air shaft	-	-	2 17 2				
	Clay-street	pipe sewer	-	76	12 12 9				
	Jacob's Wells-mews	- ditto	-	134	25 10 10				
	Hayes-mews	- ditto	-	140	26 13 7				
	Beaumont-mews	pipe sewer and 4 gullies	-	503	104 8 6				
	Great York-mews	- ditto	-	154	26 7 6				
	Cross Keys-mews	pipe sewer and 4 gullies	-	232	67 18 10				
	South-mews	pipe sewer and 1 gully	-	180	33 19 9				
	Burton-street	1 air shaft	-	-	4 1 10				
	Carlisle-street	1 new gully	-	-	5 4 3				
	Ashby-place	1 - ditto	-	-	5 4 3				
	North-street	1 air shaft	-	-	4 5 –				
	Newnham-street	1 - ditto	-	-	2 14 8				
	Avenue-road	2 - ditto	-	-	5 7 9				
	Upper Gloucester-place	1 - ditto	-	-	4 – 8				
	Allsop-mews	1 new gully	-	-	2 11 5				
	Grosvenor-square	1 - ditto	-	-	5 1 3				
	George-street	1 air shaft	-	-	4 18 7				
	Weymouth-street	1 - ditto	-	-	10 12 4				
	Brand-street	1 - ditto	-	-	3 6 1				
	Dorchester-place	1 - ditto	-	-	3 12 –				

Cork-street	1 ditto					5 12 1				
Various localities	private drains, &c.					124 – 10	216 8 4	488 10 9	18 4 2	1,560 5 1
14, Portman-square	improvement works					26 6 9				
24 & 25, Upper York-street	ditto					39 11 –	—	—	—	
Abingdon-street	2 new gullies					12 6 10				65 17 9
Carlisle-street	2 - ditto					10 10 10				
Devonshire Mews	2 - ditto					9 1 10				
Hay's Mews	2 - ditto					9 12 1				
Hertford-street	2 - ditto					9 9 6				
James-street	1 side entrance					8 18 8				
Old Palace-yard	3 new gullies					27 13 3				
Tachbrook-street	1 - ditto					3 8 10				
New Palace-yard	urinal					8 7 1				
Ashley-street	2 new gullies					10 1 2				
Broad Sanctuary	2 - ditto					14 19 9				
Horse and Groom Yard	1 - ditto					1 7 6				
Morpeth-place	3 - ditto					16 14 8				
Carlisle-street	7 - ditto					41 14 1				
Vauxhall-road	2 - ditto					15 10 2				
Carteret-street	pipe sewer				334	86 5 3				
Various localities	private drains, &c.					20 7 –	207 14 1	384 17 9	155 5 –	1,054 5 4
Gloucester-street	4 new gullies					23 7 11				
St. George's-road	6 air shafts					24 2 11				
						12 – 11				
Charlwood-street	4 new gullies					26 3 3				
Sussex-street	2 - ditto					15 2 9				
Clarendon-street	2 - ditto					11 18 10				
Hanover-street	6 - ditto					35 10 5				
Warwick-square	4 - ditto					21 6 1				
Albion-terrace	1 - ditto					6 13 5				
Rochester-row	2 - ditto					10 – 7				
Strutton-ground	1 air shaft					4 4 6				
Rochester-row	1 - ditto					3 11 –				
King's Head-yard	1 new gully					6 7 6				
Broad Sanctuary	1 - ditto					5 1 1				
Victoria-street	1 - ditto					6 10 5				
Hereford-street	2 - ditto					8 13 –				
Various localities	private drains, &c.					28 19 6	208 2 5	508 14 8	35 11 1	1,002 2 3
Carlysle-street	1 air shaft					1 2 8				
Broad Sanctuary	1 new gully					5 13 –				
Great Peter-street	1 air shaft					2 11 4				
Wyndham-place	1 - ditto					3 11 5				
Charlwood-street	1 new gully					5 19 5				
Eccleston-place	1 air shaft					3 17 –				
Grosvenor-place	1 new gully					6 6 1				
Ponsonby-street	2 - ditto					13 13 11				

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cess-pits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Western—*continued*	Chapel-place	1 new gully	- -	- -	7 17 7				
	Abingdon-street	1 - ditto	- -	- -	8 11 –				
	Old Palace-yard	1 - ditto	- -	- -	12 13 2				
	Marylebone-lane	1 air shaft	- -	- -	5 3 –				
	New-street, Portland town	5 new gullies	- -	- -	24 5 4				
	Wood-street, Westminster	1 air shaft	- -	- -	4 11 10				
	Dorset-square	1 - ditto	- -	- -	4 1 3				
	Brewers-green	1 new gully	- -	- -	4 13 10				
	Princes-street	1 - ditto	- -	- -	2 15 11				
	Wilton-place	2 - ditto	- -	- -	9 9 3				
	Barlow-mews	3 - ditto	- -	- -	9 19 2				
	Charles-street	1 air shaft	- -	- -	3 14 7				
	Various localities	private drains, &c.	- -	- -	54 12 6	389 11 10	469 5 2	66 14 2	1,120 14 5
	Victoria-street Sewer	compensations	- -	- -	- - -	- - -	- - -	2,792 1 8	
	Ditto	incidental thereto	- -	- -	- - -	- - -	- - -	163 15 11	
	High-street, Marylebone	compensation	- -	- -	- - -	- - -	- - -	14 – –	2,969 17 7
	Various localities	flap-keepers	- -	- -	- - -	- - -	- - -	193 7 8	193 7 8
	Ditto	wages	- -	- -	- - -	- - -	– 3 2	34 1 3	34 4 5
	Ditto	Supervision, &c.	- -	- -	- - -	- - -	- - -	843 18 4	843 18 4
	J. Burton & Sons	repairs and hire of engines	- -	- -	- - -	- - -	- - -	188 15 1	188 15 1
	Rettie	repairs, &c.	- -	- -	- - -	2 5 –	—	—	2 5 –
	King's Scholars Pond	gas	- -	- -	- - -	- - -	- - -	4 – –	4 – –
	Various	lithography, &c.	- -	- -	- - -	- - -	- - -	6 10 5	6 10 5
	Advertisements	for tenders	- -	- -	- - -	- - -	- - -	4 6 3	4 6 3
			1,906	2,574					£. 11,613 12 4

REGENT-STREET -	Various localities - -	cleansing, &c. - -	-	-	-	- - -	- - -	- 15 6	- 12 -	1 7 6	
	Ditto - - - -	private drains, &c. -	-	-	-	2 12 -	5 9 1	44 1 5	12 16 4	64 18 10	
	Ditto - - - -	- ditto - - -	-	-	-	1 4 6	4 18 8	148 18 4	—	155 1 6	
	Cockspur-street - -	side entrance, &c. -	-	-	-	299 2 3					
	Various localities - -	private drains, &c. -	-	-	-	21 5 6	4 6 1	55 3 10	9 13 7	389 11 3	
	Waterloo-place - -	1 new gully - -	-	-	-	21 7 3					
	B. Mews, York-terrace -	1 - ditto - -	-	-	-	13 5 -					
	Various localities - -	private drains, &c. -	-	-	-	1 4 6	30 7 1	{ 7 17 1 / 29 - 5 }	9 - -	112 1 4	
	Regent-street - - -	tide valves - -	-	-	-	- - -	- - -	- - -	1 - -	1 - -	
	Various localities - -	supervision, &c. -	-	-	-	- - -	- - -	- - -	137 3 7	137 3 7	
									£.	861 4 -	
EASTERN - - -	Goodge-street, &c. - -	brick sewer - -		228	- -	116 3 4					
	Great Windmill-street -	brick sewer, &c. - -		1,200	- -	1,986 5 8	—	—	—	2,102 9 -	
	Lumley-court - -	pipe sewer - - -	-	-	120	40 15 -					
	Berner's-mews - -	- ditto - - -	-	-	550	132 16 -					
	Norfolk-street - -	1 air shaft - - -	-	-	- -	4 8 -					
	Vere-street - - -	1 new gully - - -	-	-	- -	2 7 1					
	Blue Anchor-court - -	1 - ditto - - -	-	-	- -	7 2 2					
	Strand, by Villiers-street -	1 air shaft - - -	-	-	- -	5 - 11					
	Hop-gardens - - -	pipe sewer - - -	-	-	265	71 11 4					
	Drury-court - - -	pipe sewer and 2 gullies	-	-	287	77 1 2					
	Hampshire Hog-yard -	2 new gullies - -	-	-	- -	3 3 10					
	Carnaby-street - -	1 air shaft - - -	-	-	- -	1 15 2					
	Clement's-lane - -	2 - ditto - - -	-	-	- -	6 13 5					
	Milford-lane - - -	pipe sewer - - -	-	-	584	138 18 2					
	Endell-street - - -	- ditto - - -	-	-	20	4 11 6					
	Denham-yard - -	- ditto - - -	-	-	106	21 17 8					
	Pettyford-court - -	pipe sewer and 3 gullies	-	-	115	45 8 10					
	Greyhound-court - -	- ditto - - -	-	-	86	27 9 2					
	Various localities - -	private drains, &c. -	-	-	- -	19 19 -	41 5 5	246 3 11	26 17 -	925 4 9	
	Ditto - - - -	private drain, &c. -	-	-	- -	- 11 -	—	3 9 -	- 9 -	4 9 3	
	Holbrook-place - -	pipe sewer and 2 gullies	-	-	76	24 8 1					
	Holbrook-court - -	pipe sewer and 1 gully -	-	-	80	28 5 8					

(continued)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing, by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
EASTERN—*continued*	Fitzroy-court	pipe sewer and 1 gully	- -	137	43 3 3				
	Crown-court	- ditto	- -	140	43 — 5				
	Titchfield-street	pipe sewer	- -	130	31 1 7				
	Coventry-court	- ditto	- -	456	92 6 4				
	Buckingham-place	- ditto	- -	130	30 16 4				
	Wyld-court	pipe sewer and 2 gullies	- -	102	34 2 6				
	Grange-court	pipe sewer and 1 gully	- -	156	44 6 1				
	Hanoway-street	2 new gullies	- -	- -	6 6 11				
	Welsh's-court	1 - ditto	- -	- -	7 — 5				
	Strand, by 420	1 air shaft	- -	- -	6 3 10				
	Strand, by Essex-street	1 new gully	- -	- -	5 15 9				
	Scott's Arms Yard	pipe sewer and 2 new gullies.	- -	94	22 3 6				
	Market-row	pipe sewer	- -	160	32 3 5				
	Wyld-passage	pipe sewer and 1 new gully.	- -	215	48 3 5				
	Church-street, Soho	2 air shafts	- -	- -	2 18 3				
	Strand, by Durham-street	1 - ditto	- -	- -	3 19 8				
	St. Martin's-lane	1 - ditto	- -	- -	1 12 2				
	Leicester-square	brick sewer, &c.	190	- -	107 10 7				
	King-street	- ditto	594	- -	454 7 4				
	Covent-garden	urinal	- -	- -	19 19 8				
	Various localities	private drains, &c.	- -	- -	58 5 8	22 19 10	306 7 3	28 5 3	1,505 13 2
	Queen's Head Yard	pipe sewer and 2 gullies	- -	80	26 12 3				
	King-street, St. James's	2 air shafts	- -	- -	8 — —				
	Church-street, St. Giles's	3 new gullies	- -	- -	12 1 9				
	White Horse-yard	pipe sewer	- -	197	51 8 6				
	Macclesfield-street	1 air shaft	- -	- -	3 15 2				
	Arthur-street	3 new gullies	- -	- -	14 18 6				
	Various localities	private drains, &c.	- -	- -	19 17 4	16 7 5	262 11 10	18 7 1	433 19 10
	Church-lane, Carrier-street, &c.	pipe sewers, &c.	- -	800	333 15 2	—	—	—	333 15 2

Southampton-street -	pipe sewer and gully -	-	-	120	25	18	6															
Buckingham-street -	- ditto - - -	-	-	40	10	13	5															
Various localities - -	private drains, &c. -	-	-	- -	34	9	9	67	2	2	413	19	9	48	3	3						
																	600	6	10			
Shire-lane - - -	1 new gully - -	-	-	- -	3	16	1															
Coal-yard, Drury-lane -	1 - ditto - - -	-	-	- -	4	6	7															
Various localities - -	private drains, &c. -	-	-	- -	5	6	6	41	9	2	71	5	2	20	12	6						
					22	1	4	27	9	11	167	11	7									
																	363	18	10			
Carrier-street - - -	tank and water supply -	-	-	- -	-	-	-	-	-	-	-	-	-	69	16	6						
																	69	16	6			
Various localities - -	flap-keepers - -	-	-	- -	-	-	-	-	-	-	-	-	-	75	7	10						
																	75	7	10			
Victoria-street sewer -	compensations - -	-	-	- -	-	-	-	-	-	-	-	-	-	1,396	-	10						
																	1,396	-	10			
Ditto - - - -	incidental thereto -	-	-	- -	-	-	-	-	-	-	-	-	-	81	17	11						
																	81	17	11			
Poland-street - -	compensation - -	-	-	- -	-	-	-	-	-	-	-	-	-	5	-	-						
																	5	-	-			
Various localities - -	wages - - -	-	-	- -	-	-	-	-	-	-	-	2	6	8	19	2						
																	9	1	8			
Ditto - - - -	supervision, &c. - -	-	-	- -	-	-	-	-	-	-	-	-	-	577	7	-						
																	577	7	-			
J. Burton & Sons - -	repairs and hire of engines.	-	-	- -	-	-	-	-	-	-	-	-	-	94	7	7						
																	94	7	7			
Rettie - - - -	repairs, &c. - -	-	-	- -	-	-	-	3	17	-	—			—								
																	3	17	-			
Standage - - -	lithography - -	-	-	- -	-	-	-	-	-	-	-	-	-	3	4	5						
																	3	4	5			
Advertisements - -	for tenders, &c. - -	-	-	- -	-	-	-	-	-	-	-	-	-	4	6	3						
																	4	6	3			
22, Ship-yard - -	improvement works -	-	-	- -	5	12	6															
23 - ditto - - -	- ditto - - -	-	-	- -	3	6	7															
24 - ditto - - -	- ditto - - -	-	-	- -	6	-	-															
25 - ditto - - -	- ditto - - -	-	-	- -	4	3	6															
26 - ditto - - -	- ditto - - -	-	-	- -	3	11	5															
49, New Compton-street -	- ditto - - -	-	-	- -	23	17	3															
1, Porter-street, Soho -	- ditto - - -	-	-	- -	17	8	5															
18, St. Martin's-court -	- ditto - - -	-	-	- -	11	18	7															
Rose and Crown-court -	- ditto - - -	-	-	- -	-	16	-															
5, York-street - -	- ditto - - -	-	-	- -	19	10	2															
379, Oxford-street -	- ditto - - -	-	-	- -	20	4	8															
17, Brydges-street -	- ditto - - -	-	-	- -	16	15	6															
1, Great Russell-street -	- ditto - - -	-	-	- -	25	2	4															
9, Ship-yard - -	- ditto - - -	-	-	- -	9	11	8															
1, Chair-court - -	- ditto - - -	-	-	- -	1	10	-															
41, Hart-street - -	- ditto - - -	-	-	- -	-	18	4															
42 - ditto - - -	- ditto - - -	-	-	- -	1	5	11															

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
EASTERN—*continued*	3, Thanet-place	improvement works	-	-	8 17 9				
	4 - ditto	ditto	-	-	18 6 4				
	17, Tottenham-court-road	ditto	-	-	9 6 1				
	44, Dean-street	ditto	-	-	30 6 3				
	Whitehall, St. Giles's	ditto	-	-	– 19 –				
	9 11, George-street, St. Giles'	ditto	-	-	1 10 –	—	—	—	240 18 3
	7, Great Castle-street	ditto	-	-	24 14 9				
	19, Blackmore-street	ditto	-	-	10 9 2				
	19, Clare-court	ditto	-	-	17 17 6				
	Rose & Crown-court	ditto	-	-	16 19 4				
	46, Upper Marylebone-street.	ditto	-	-	15 19 10				
	49 A, Lincoln's Inn-fields	ditto	-	-	10 8 2				
	13, 14 and 15, Portsmouth-street.	ditto	-	-	10 9 1				
	16 - - ditto	ditto	-	-	9 9 5				
	Donaldson-buildings	ditto	-	-	14 17 6				
	7, Crown-court	ditto	-	-	8 15 9				
	Church-lane	ditto - 21 houses	-	-	213 1 –	—	—	—	353 1 6
	Ditto	ditto - 5 ditto	-	-	45 18 4				
	George-street	ditto - 3 ditto	-	-	18 10 2				
	Welsh's-court	ditto - 2 ditto	-	-	20 11 4				
	Hampshire Hog Yard	improvement works	-	-	10 – 2				
	Fletcher's-court	ditto - 2 houses	-	-	21 4 9				
	Kennedy's-court	ditto - 3 ditto	-	-	32 10 8				
	Carrier-street	ditto - 7 ditto	-	-	70 7 11				
	34, Great St. Andrew's-street.	- - - -	-	-	15 2 4				
	7, Crown-court, Soho	- - - -	-	-	7 15 7				
	16, Drury-court	- - - -	-	-	10 7 1	—	—	—	252 8 4
			2,212	5,246				£.	9,436 11 11

HOLBORN - - -	Chalton-street, &c. - -	brick sewer - - -	1,800	- -	1,006 8 8				
	King's-road - - -	- ditto - - -	300	- -	122 13 5				
	Swain's-lane, &c. - -	- ditto - - -	666	- -	178 12 10				
	Willis-road and Angler's-lane.	- ditto, &c. - -	1,747	- -	1,339 4 5				
	Kentish-town-road - -	brick sewer - - -	500	- -	422 - -				
	Ditto - No. 2, contracts	- ditto - - -	170	- -	147 - -	—	—	—	3,215 19 4
	Various localities - -	private drains - -	- -	- -	3 3 -	- 3 9	14 5 11	—	17 12 8
	Queen's-road - - -	3 new gullies - -	- -	- -	15 4 6				
	Tudor-lodge-lane - -	pipe sewer and gully -	- -	182	39 9 -				
	Miller-street - - -	- ditto - - -	- -	248	48 5 -				
	Highgate Rise - -	- ditto - - -	- -	262	44 17 9				
	Nelson-street - - -	- ditto and gully -	- -	210	40 17 8				
	Caroline-street - -	- ditto and 2 gullies -	- -	227	48 18 4				
	Fulwood's-rents - -	- ditto - - -	- -	421	97 7 9				
	Kingsgate-street - -	brick sewer, &c. - -	379	- -	165 14 7				
	Greenland-place - -	- ditto - - -	411	- -	178 3 -				
	Brunswick-street - -	- ditto - - -	71	- -	64 5 -				
	Brunswick-buildings -	pipe sewer and 3 gullies	- -	576	131 4 7				
	Speedy-place - -	- ditto and 2 gullies -	- -	84	77 2 9				
	Crawley-mews - -	- ditto and 1 gully -	- -	50	11 4 8				
	Wellington-street - -	brick and pipe sewers, &c.	360	210	194 15 3				
	Grove-street - - -	- ditto - - -	404	290	201 11 1				
	South Crescent-mews -	pipe sewer and gullies -	- -	712	125 7 5				
	Various localities - -	private drains, &c. - -	- -	- -	60 17 10	126 16 3	241 - 4	1 4 9	1,914 7 6
	New-road - - -	1 new gully - -	- -	- -	4 10 7				
	Bell-court - - -	1 - ditto - - -	- -	- -	8 19 2				
	Oakley-square - -	2 - ditto - - -	- -	- -	9 3 8				
	Liquorpond-street - -	pipe sewer, &c. - -	- -	154	35 18 4				
	Percy-street - - -	1 new gully - -	- -	- -	3 19 10				
	Malden-road - - -	3 new gullies - -	- -	- -	13 9 3				
	Mansfield-place - -	pipe sewer - - -	- -	58	10 2 9				
	Chalton-street - -	2 new gullies - -	- -	- -	9 4 6				
	Rochester-square - -	2 - ditto - - -	- -	- -	7 6 -				
	Haverstock-street - -	1 - ditto - - -	- -	- -	3 2 1				
	Oval-road - - -	1 - ditto - - -	- -	- -	3 9 2				
	Charrington-street - -	1 - ditto - - -	- -	- -	9 16 4				
	Queen's-road - - -	5 - ditto - - -	- -	- -	21 8 3				
	Fitzroy-road - - -	1 - ditto - - -	- -	- -	6 5 6				
	Various localities - -	private drains, &c. -	- -	- -	34 9 4	68 16 7	238 13 10	19 14 3	508 9 5
	Three Cups Yard - -	1 new gully - -	- -	- -	3 9 10				
	Queen's-road - - -	2 new gullies - -	- -	- -	9 - 9				
	Chalcot-place - -	4 - ditto - - -	- -	- -	17 9 10				
	Skinner-street - -	2 - ditto - - -	- -	- -	7 9 1				
	Diana-place - - -	1 air shaft - - -	- -	- -	1 3 2				

(continued)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Holborn—*continued*	West-street, Somers-town	pipe sewer	- -	149	50 15 9				
	Robert's-mews	ditto	- -	364	75 19 3				
	Prince of Wales Road	brick sewer	237	- -	121 19 6				
	Skinner-street	ditto	162	- -	79 14 11				
	Various localities	private drains, &c.	- -	- -	21 2 4	33 8 1	—	—	421 12 6
	Church-road	1 new gully	- -	- -	3 8 8				
	Agar-town	1 ditto	- -	- -	5 2 9				
	Downshire-hill	pipe sewer	- -	236	29 4 1				
	Spanish-place	1 new gully	- -	- -	5 6 7				
	Diana-place	1 ditto	- -	- -	3 9 8				
	Gloucester-road	2 side entrances	- -	- -	36 10 4				
	Took's-court	3 new gullies	- -	- -	11 8 7				
	Old St. Pancras-road	1 new gully	- -	- -	3 12 7				
	Various localities	private drains, &c.	- -	- -	15 18 9	28 — 8	88 13 8	6 11 1	237 7 5
	Great James-street	2 new gullies	- -	- -	5 10 5				
	Church-row	1 new gully	- -	- -	4 1 —				
	Rochester-terrace and road	7 ditto	- -	- -	31 9 10				
	Chesnut-buildings	1 ditto	- -	- -	5 11 8				
	Prince's-terrace	2 ditto	- -	- -	8 15 8				
	King's-road	brick sewer, &c.	318	- -	232 15 7				
	Grafton-road	1 air shaft	- -	- -	— 10 7				
	Stratford-place	1 new gully	- -	- -	3 19 6				
	High-street, Camden-town	1 ditto	- -	- -	6 19 6				
	Brook-street	1 ditto	- -	- -	9 13 4				
	Woburn-mews, West	pipe sewer	- -	100	20 1 7				
	Great James-street	2 new gullies	- -	- -	5 15 4				
	Harmood-street	brick sewer, &c.	314	- -	179 2 4				
	Gloucester-crescent	1 air shaft	- -	- -	16 19 10				
	St. Paul's Road	1 new gully	- -	- -	4 4 4				
	Camden-square	3 new gullies	- -	- -	11 11 —				
	Bagnigge-wells	1 new gully	- -	- -	3 15 8				
	Cross-street	2 new gullies	- -	- -	4 10 —				

King's-road	1 new gully			2 4 –					
Wandford-place	1 - ditto			3 2 3					
Various localities	private drains, &c.			60 1 6	114 4 –	273 10 1	32 11 5		1,041 – 5
7, Kingsgate-street	improvement works			12 7 7	—	—	—		12 7 7
Keppel-street chapel	- ditto			22 12 1					
18, Tooke's-court	- ditto			17 5 11					
22, 25, Pratt-street	- ditto			38 9 6	—	—	—		78 7 6
Various localities	wages			– – –	– – –	– 3 6	—		– 3 6
Ditto	supervision, &c.			– – –	– – –	– – –	655 12 6		655 12 6
Advertisements	tenders, &c.			– – –	– – –	– – –	3 10 6		3 10 6
		7,839	4,533					£.	8,106 10 10
FINSBURY	Tabernacle-walk	brick sewer	1,100	–	435 17 9				
	Shrubland-road	brick sewer, &c.	990	–	374 07 7				
	Holloway-road	brick sewer	1,280	–	544 2 –				
	Ball's Pond-road	- ditto	700	–	226 – 7				
	King Henry-street	brick and pipe sewers, &c.	1,706	62	1,203 6 10				
	Felix-terrace	brick sewer	250	–	97 4 6				
	Seven Sisters Road	- ditto	300	–	120 10 5				
	Henry-street, Pentonville	- ditto	250	–	92 9 4				
	Bridport-place	- ditto	950	–	388 – –	—	—	—	3,482 9 –
	Various localities	private drains, &c.	–	–	5 15 2	2 5 7	13 17 –	—	21 17 9
	Brooksby-street	1 air shaft	–	–	3 9 10				
	Bell-alley	brick sewer, &c.	46	–	28 2 8				
	Dean's-yard	pipe sewer and gully	–	94	21 17 11				
	Weymouth-terrace	brick sewer, &c.	150	–	49 7 9				
	Seven Sisters Road	- ditto	174	–	55 18 4				
	Radnor-street	- ditto	463	–	188 17 8				
	Dove-row	brick and pipe sewer	300	433	194 8 6				
	White House Court	pipe sewer	–	50	6 19 9				
	Dady's-rents	pipe sewer and gullies	–	550	130 19 7				
	Lower-road, Islington	brick sewer	100	–	81 19 9				
	6, Flemming-street	improvement	–	–	13 11 11				
	43, Henry-street	- ditto	–	–	24 14 11				
	8, Tabernacle-square	- ditto	–	–	18 – 9				
	Various localities	private drains, &c.	–	–	46 9 9	254 17 5	418 5 7	5 14 5	1,543 16 6

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	TOTAL.
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
FINSBURY—*continued*	Sermon-lane	pipe sewer	–	108	23 4 7				
	Hemsworth-street	4 new gullies	–	–	14 16 8				
	Freeling-street	1 side entrance, &c.	–	–	3 12 8				
	William-street, North	1 - ditto	–	–	3 12 9				
	Banmerton-street	2 air shafts	–	–	– 15 6				
	Lyon-street	1 - ditto	–	–	– 7 9				
	Storey-street	1 - ditto	–	–	– 7 9				
	Edith-street	2 new gullies	–	–	8 – –				
	Herbert-street	3 - ditto	–	–	12 – –				
	Little Cambridge-street	1 - ditto	–	–	7 6 6				
	York-street, North	4 - ditto	–	–	16 8 8				
	Percy-circus	1 - ditto	–	–	4 13 8				
	Northampton-road	4 - ditto	–	–	18 6 8				
	Castle-street	1 side entrance	–	–	13 3 7				
	Bingfield-street	3 air shafts	–	–	1 3 5				
	Offord-road	8 new gullies	–	–	33 2 11				
	Various localities	private drains, &c.	–	–	20 14 10	57 4 9	264 17 1	15 – 4	519 – 1
	St. Mary's Road	improvement work	–	–	20 5 4				
	Sutton-square	2 new gullies	–	–	1 8 –				
	Dove-row	1 - ditto	–	–	2 11 11				
	Goldsmiths-row	1 - ditto	–	–	3 8 –				
	Ball's Pond Road	2 - ditto	–	–	7 1 6				
	Shrubland-road	2 - ditto	–	–	6 16 11				
	Various localities	private drains, &c.	–	–	19 9 6	3 3 4	82 7 1	8 14 –	135 – 3
	Maidstone-street	1 new gully	–	–	1 14 10				
	New Gloucester-street	1 - ditto	–	–	1 19 6				
	Sutton-square	2 - ditto	–	–	1 8 –				
	York-place	1 - ditto	–	–	– 9 1				
	Milton-road	1 - ditto	–	–	– 9 2				
	New North-road	2 - ditto	–	–	7 18 6				
	Rosemary-lane	pipe sewer	–	143	31 10 9				
	Bagnigge Wells Road	1 new gully	–	–	3 16 3				

	Upper-street, Islington	pipe sewer	-	60	10 14 –				
	Aberdeen-park	- ditto	-	556	100 17 1				
	Northampton-square	1 new gully	-	-	4 7 4				
	Railway station	1 - ditto	-	-	4 7 5				
	Caledonian-road	1 - ditto	-	-	4 3 1				
	Charterhouse-street	pipe sewer	-	64	14 12 1				
	Compton-street	brick and pipe sewer, &c.	463	270	313 2 4				
	Hayward's-place	1 new gully	-	-	4 6 9				
	Britannia-fields	1 air shaft	-	-	– 9 2				
	Seven Sisters Road	4 new gullies	-	-	2 16 –				
	Various localities	private drains, &c.	-	-	43 1 –	75 17 3	351 10 –	55 – 4	1,034 9 11
	Ditto	re-paving, &c.	-	-	- - -	- - -	- - -	41 1 9	41 1 9
	Ditto	wages	-	-	- - -	- - -	– 3 6	—	– 3 6
	City Commissioners	rent	-	-	- - -	- - -	- - -	300 – –	300 – –
	Various localities	supervision, &c.	-	-	- - -	- - -	- - -	647 16 2	647 16 2
	Advertisements	tenders	-	-	- - -	- - -	- - -	7 16 –	7 16 –
	New River Company	supply of water	-	-	- - -	- - -	24 17 6	—	24 17 6
			9,222	2,390				£.	7,778 13 9
H	SPITALFIELDS, &c.	White Horse-street	brick sewer	-	900	- -	474 – 10				
		Commercial-street	- ditto	-	500	- -	288 3 4				
		Brook-street	- ditto	-	642	- -	411 14 9				
		Collingwood-street	- ditto	-	580	- -	118 7 8	—	—	—	1,292 6 7
		Various localities	private drains, &c.	-	- -	- -	58 12 6	162 6 2	564 18 11	39 2 4	824 19 11
		Walburgh-street	pipe sewer	-	- -	150	33 15 –				
		Regent-street, Mile End Old Town.	- ditto	-	- -	702	80 11 6	—	—	—	114 6 6
		Various localities	private drains, &c.	-	- -	- -	3 12 –	4 12 5	3 3 2	5 10 1	16 17 8
		Goulstone-street	pipe sewer	-	- -	3,500	1,580 5 10	—	—	—	1,580 5 10
		Union-place	brick sewer	-	420	- -	168 – –				
		Ditto	2 air shafts	-	- -	- -	2 3 9				
		Manor-street	1 new gully	-	- -	- -	2 9 –				
		Winchester-street	brick sewer, &c.	-	466	- -	160 – –				
		John's-hill, Ratcliffe	1 new gully	-	- -	- -	2 14 3				

(continued)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Spitalfields, &c.—*cont*^{d} -	Fountain Alley - -	2 air shafts - - -	- -	- -	8 2 –				
	Ann's-place - -	6 - ditto - - -	- -	- -	15 1 –				
	North-passage - -	1 - ditto - - -	- -	- -	3 3 –				
	Trafalgar-street - -	pipe sewer - - -	- -	146	16 – –				
	Devonshire-street - -	1 new gully - -	- -	- -	2 14 –				
	Artillery-street - -	2 new gullies - -	- -	- -	4 17 –				
	Portman-place - -	1 new gully - -	- -	- -	3 4 –				
	Various localities - -	private drains, &c.	- -	- -	47 12 1	165 4 7	580 16 9	30 12 11	1,212 14 4
	1, Virginia-row - -	improvement works -	- -	- -	19 7 5				
	2 ditto - - -	- ditto - - -	- -	- -	21 10 2				
	2 ditto - - -	- ditto - - -	- -	- -	22 15 3				
	3 ditto - - -	- ditto - - -	- -	- -	16 10 4				
	3 ditto - - -	- ditto - - -	- -	- -	17 8 2				
	4 ditto - - -	- ditto - - -	- -	- -	17 6 –				
	4 ditto - - -	- ditto - - -	- -	- -	18 4 2				
	5 ditto - - -	- ditto - - -	- -	- -	16 17 11				
	5 ditto - - -	- ditto - - -	- -	- -	9 11 11				
	6 ditto - - -	- ditto - - -	- -	- -	9 12 5				
	5 ditto - - -	- ditto - - -	- -	- -	18 1 9				
	6 ditto - - -	- ditto - - -	- -	- -	16 13 4				
	6 ditto - - -	- ditto - - -	- -	- -	5 17 3				
	7 ditto - - -	- ditto - - -	- -	- -	9 11 –				
	6 ditto - - -	- ditto - - -	- -	- -	20 12 1				
	7 ditto - - -	- ditto - - -	- -	- -	18 13 3				
	26 ditto - - -	- ditto - - -	- -	- -	19 – 1				
	27 ditto - - -	- ditto - - -	- -	- -	19 14 5				
	28 ditto - - -	- ditto - - -	- -	- -	8 13 10				
	34, Squiries-street - -	- ditto - - -	- -	- -	16 8 4				
	22, Saville-place - -	- ditto - - -	- -	- -	40 8 6				
	23, ditto - - -	- ditto - - -	- -	- -	23 18 11				
	2, London-terrace -	- ditto - - -	- -	- -	24 5 9	—	—	—	411 2 3
	Wellclose-square - -	1 air shaft - - -	- -	- -	1 4 6				
	Cannon-street-road -	1 - ditto - - -	- -	- -	1 12 10				

Bull-lane, Stepney	1 ditto			– 19 3						
Paternoster-row	pipe sewer		170	18 19 7						
Eele-place	ditto		234	23 17 7						
Turville-street	2 new gullies			5 3 7						
Old Ford-road	1 - ditto			2 7 2						
High-street, Shadwell	1 air shaft			1 3 11						
Wentworth-street	1 - ditto			1 17 –						
York-street	1 new gully			2 – 5						
New-road	1 - ditto			3 10 3						
Limekiln-hill	1 side entrance, &c.			20 19 4						
Wellington-street	1 air shaft			2 18 3						
Shadwell Dock-stairs	1 side entrance, &c.			26 1 –						
Ocean-street	2 new gullies			3 14 –						
Mortimore-road	1 side entrance			14 18 5						
Brown's-lane	3 new gullies			14 13 5						
John-street	3 - ditto			9 2 9						
East-street	4 - ditto			21 13 11						
Richardson-street	2 - ditto			4 18 10						
Lady Lake's-grove	1 - ditto			1 10 6						
Various localities	private drains, &c.			37 15 11	207 11 9	423 5 9	17 2 10	869 2 9		
James-street	1 new gully			2 8 1						
Hereford-street	2 - ditto			9 17 –						
Old Ford-road	1 - ditto			2 12 2						
Green-street	1 - ditto			1 18 8						
Charrington-park	3 side entrances, &c.			9 11 8						
Silver-street	2 new gullies			4 13 11						
Nightingale-lane	1 side entrance			13 2 8						
London-terrace	1 new gully			17 9 3						
Sandy's-row	1 air shaft			2 8 7						
Emma-street	brick and pipe sewers, &c.	210	398	136 8 3						
Lamb-street	2 new gullies			4 10 –						
Various localities	private drains, &c.			38 5 –	170 16 3	421 10 5	14 7 1	849 19 –		
Sandy's-row	1 air shaft			1 3 6						
Nightingale-lane	1 side entrance			39 3 8						
Commercial-road	1 air shaft, &c.			12 9 1						
Mansell-street	1 - ditto			6 6 –						
Various localities	private drains, &c.			11 5 11	99 12 2	88 17 1	3 12 4	262 9 9		
Friendly-place	pipe sewer		360	35 19 4						
Sidney-street	2 new gullies			5 11 11						
Mile End-road	1 air shaft			1 9 8						
Wheeler-street	1 new gully			9 16 –						
Gates-street	1 - ditto			4 16 7						
Mile End-road	1 - ditto			1 15 3						
Cannon-street-road	1 side entrance			34 8 5						
Back of Saville-road	pipe sewer		320	49 10 6						
Various localities	private drains, &c.			33 18 7	150 12 10	446 6 6	11 5 1	785 10 8		

(continued)

Enclosure No. 1, with No. 1 —*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*
SPITALFIELDS, &c.—*cont^d* -	Various localities - -	sluice-keepers - -	- -	- -	- - -	- - -	- - -	70 - -	70 - -
	Stink-house Bridge -	buck sewer - -	123	- -	74 - -	—	—	—	74 - -
	Johnson (Brick-lane) -	compensation - -	- -	- -	- - -	- - -	- - -	5 - -	5 - -
	Cork (Boar's-head-yard) -	- ditto - - -	- -	- -	- - -	- - -	- - -	3 3 -	3 3 -
	Various localities - -	supervision, &c. - -	- -	- -	- - -	- - -	- - -	403 - 4	403 - 4
	Goulstone-street - -	supervision, special -	- -	- -	- - -	- - -	- - -	31 13 3	31 13 3
			3,841	6,180				£.	8,806 11 10
HACKNEY BROOK -	Dalston-lane, &c. - -	brick and pipe sewer -	700	200	270 6 6				
	High-street, Homerton -	brick and pipe sewer, &c.	1,500	94	699 17 10	—	—	—	970 4 4
	King Edward-road -	1 side entrance, &c. -	- -	- -	6 6 10				
	St. Thomas's-road - -	1 air shaft - - -	- -	- -	- 10 2				
	Mount Pleasant-lane -	pipe sewer - - -	- -	412	57 - -				
	Park-place, South Hackney	brick sewer - -	344	- -	147 - -				
	Ditto - - - -	1 air shaft - -	- -	- -	1 15 3				
	Various localities - -	private drains, &c. -	- -	- -	5 2 6	37 1 9	55 1 -	1 7 11	311 5 5
	Caroline-street, Hackney -	2 new gullies - -	- -	- -	4 18 -				
	Various localities - -	private drain, &c. -	- -	- -	- 16 6	—	1 13 9	- 2 1	7 10 4
	Stoke Newington Common	pipe sewer - - -	- -	100	12 5 -				
	Mayfield-road - -	1 air shaft - - -	- -	- -	1 14 1				
	Shacklewell-road - -	pipe sewer, &c. - -	- -	1,590	196 6 8				
	Hackney Brook - -	pipe sewer - - -	- -	100	17 15 -				

	West-end, Cleveland-street	1 new gully			4 16 –				
	Grove-lane	1 - ditto			4 17 8				
	Various localities	private drains, &c.			5 18 2	23 10 5	41 7 3	1 12 –	310 2 3
	Park-place	pipe sewer		150	18 5 6				
	Various localities	private drains, &c.			4 13 –	45 8 4	2 10 – / 69 17 1	3 2 9	
	Shrubland Grove	1 side entrance and 3 air shafts.			4 2 1				143 16 8
	Newington Common	pipe sewer		21	3 6 4				
	Church-road	2 new gullies			5 6 5				
	Various localities	private drains, &c.			10 13 6	21 10 8	69 15 9	1 5 –	
	Ditto	ditto			– 10 –	3 11 –	18 3 6	– 12 8	115 19 9
	Ditto	ditto			3 8 1	38 10 10	102 3 6	1 19 7	22 17 2
	Ditto	supervision			- - -	- - -	- - -	91 12 3	146 2 –
									91 12 3
			2,544	2,667				£.	2,119 10 2
LOWER WAPPING	Various localities	repairs, cleansing, &c.			- - -	12 8 9	151 2 10	– 4 6	
	Ditto	ditto			- - -	4 10 3	3 12 6	- - -	163 16 1
	Ditto	ditto			- - -	15 2 5	15 16 6	1 11 8	8 2 9
	Ditto	private drains, &c.			2 – –	2 9 4	11 9 –	– 2 1	32 10 7
	Wapping Wall	1 side entrance			6 16 3				16 – 5
	Various localities	private drains, &c.			2 12 –	6 16 11	10 17 6	2 18 8	
	Anchor and Hope-alley	1 side entrance			16 4 6				30 1 4
	Various localities	private drains			1 12 –	—	11 13 3	– 11 3	
	Ditto	- - - - -			– 10 –	15 14 3	7 16 9	– 12 8	30 1 –
	Airzee	compensation			- - -	- - -	- - -	1 10 –	24 13 8
	Various localities	supervision			- - -	- - -	- - -	41 15 8	
									43 5 8
								£.	348 11 6

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
LIMEHOUSE	Various localities	private drains, &c.	- -	- -	1 13 -	12 14 5	216 13 4	- 15 5	231 16 2
	Ditto	repairs, cleansing, &c.	- -	- -	- - -	28 10 5	4 14 11	—	33 5 4
	Fore-street, Limehouse	1 side entrance	- -	- -	13 11 9				
	Various localities	repairs, cleansing, &c.	- -	- -	- - -	1 14 1	5 16 2	- 3 2	21 5 2
	Ditto	ditto	- -	- -	- - -	- 4 8	1 3 3	—	1 7 11
	Ditto	private drains, &c.	- -	- -	1 2 -	—	1 1 2	- 12 8	2 15 10
	Ditto	supervision, &c.	- -	- -	- - -	- - -	- - -	8 10 8	8 10 8
								£.	299 1 1
UPPER LIMEHOUSE	Various localities	private drain, &c.	- -	- -	- 10 -	25 7 6	2 2 4	- 12 2	28 12 -
	Ditto	repairs, cleansing, &c.	- -	- -	- - -	13 6 2	3 3 6	- - 2	16 9 10
	Ditto	supervision	- -	- -	- - -	- - -	- - -	5 17 10	5 17 10
								£.	50 19 8
TOWER HILL	Church-street, Minories	brick sewer, &c.	140	- -	89 7 -				
	Various localities	repairs, &c.	- -	- -	- - -	30 18 4	- 5 3	—	120 10 7
	Haydon-square	brick sewer	250	- -	166 7 10	—	- 5 3	- - 10	166 13 11
	Various localities	private drains, &c.	- -	- -	3 - -	—	- 15 9	- 2 9	3 18 6
	Ditto	supervision	- -	- -	- - -	- - -	- - -	12 15 6	12 15 6
			390	—				£.	303 18 6

HERMITAGE-STREET	Various localities	private drains, &c.	-	-	1 12 –	21 19 5	24 19 11	– – 8		
	Ditto	supervision	-	-	- - -	- - -	- - -	9 14 –		48 12 –
										9 14 –
									£.	58 6 –
ST. KATHARINE'S	Proportion of General Charges to Works				- - -	- - -	- - -	6 13 7		6 13 7
POPLAR AND BLACK-WALL.	Leicester-street	1 side entrance and air shaft.			7 15 11					
	Garford-street	1 side entrance	-	-	3 17 4					
	Various localities	private drains, &c.	-	-	1 2 1	58 3 9	73 19 9	– 1 8		
	Emmett-street	pipe sewer	-	520	65 4 4					145 – 6
	Glengall-place	1 new gully	-	-	3 14 –					
	Various localities	private drains, &c.	-	-	2 2 –	– 10 –	64 7 3	– 2 6		
	Poplar	3 new gullies	-	-	6 19 9					136 – –
	Various localities	private drains, &c.	-	-	2 4 –	24 3 6	62 9 9	– 6 –		
	Manchester-road	1 side entrance and 3 air shafts.	-	-	4 2 3					96 3 –
	Rope-ground, Millwall	brick sewer	53	-	23 7 9					
	Various localities	private drains	-	-	2 14 –	39 11 3	63 12 3	1 15 –		
	Wade-street, Poplar	1 new gully	-	-	2 12 2					135 2 6
	Various localities	cleansings, &c.	-	-	- - -	- - -	94 17 3	1 7 3		
	Ditto	supervision, &c.	-	-	- - -	- - -	- - -	92 15 11		98 16 8
										92 15 11
			53	520					£.	703 18 8
SURREY AND KENT	Rye-lane, Peckham	pipe sewer, &c.	-	-	468 10 –					
	St. Mary's, Bermondsey	iron-pipe sewer, &c.	-	1,751	985 6 –					
	Acre-lane, Brixton	brick sewer	272	-	51 14 7					1,453 16 –
	Wandsworth-road, Brixton	- ditto	180	-	103 8 –					
	Rodney-place	- ditto	698	-	232 – 10					
	Walcot-place	pipe sewer	-	240	31 – 8					
	Battersea Fields	- ditto	-	301	38 16 9					
	Mason-street	- ditto	-	1,832	229 5 –					

(continued)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*
Surrey and Kent—*cont^d* -	Kennington Common -	pipe sewer - - -	- -	142	35 10 2				
	Theobalds-street - -	- ditto - - -	- -	1,081	114 3 11				
	Various localities - -	private drains, &c. -	- -	- -	285 19 8				
	Half Moon-lane - -	improvement works -	- -	- -	15 18 –	508 3 2	131 6 6	22 16 2	1,800 3 5
	Cross-street - - -	2 new gullies - -	- -	- -	6 – 2				
	Various localities - -	private drains, &c. -	- -	- -	13 13 8	35 12 11	60 6 –	– 14 2	116 6 11
	Elephant and Castle -	urinals - - -	- -	- -	310 7 6	—	—	—	310 7 6
	Body's-yard, Lock's-fields	1 new gully - -	- -	- -	2 4 7				
	Russell-street - - -	10 new gullies - -	- -	- -	32 3 –				
	Hickman's Folly - -	pipe sewer - - -	- -	122	6 11 6				
	Pitt's-court - - -	1 new gully - -	- -	- -	5 18 6				
	Newington-causeway -	1 - ditto - -	- -	- -	1 17 7				
	Crescent, Southampton-street.	brick sewer - -	190	- -	33 10 6				
	Blue Anchor-road - -	pipe sewer - - -	- -	1,371	148 17 5				
	Ditto - - - -	8 new gullies - -	- -	- -	34 8 –				
	Hickman's Folly, &c. -	pipe sewer - - -	- -	26	4 15 –				
	Cross-street - - -	1 new gully - -	- -	- -	3 12 –				
	Parker's-terrace - -	1 - ditto - - -	- -	- -	2 17 2				
	Sussex-road - - -	pipe sewer - - -	- -	133	10 6 8				
	Marygold-street - -	2 new gullies - -	- -	- -	9 8 3				
	Nutkin's-corner - -	pipe sewer - - -	- -	- -	12 4 –				
	Temple-street - - -	4 new gullies - -	- -	- -	15 5 4				
	William-street - -	1 gully - - -	- -	- -	3 10 7				
	Basing-yard - - -	pipe sewer - - -	- -	208	28 11 9				
	Ditto - - - -	- ditto - - -	- -	76	7 18 3				
	Thomas-street - -	7 gullies - - -	- -	- -	24 16 1				
	Garden-row - - -	1 gully - - -	- -	- -	3 19 –				
	Cross-street - - -	2 gullies - - -	- -	- -	6 12 2				
	Prince's-square - -	4 - ditto - - -	- -	- -	37 6 1				
	Church street, Lambeth -	pipe sewers - -	- -	989	159 9 7				
	Pratt-street - ditto -	- ditto - - -	- -	498	53 15 9				

Tower-street	-	-	- ditto	-	-	-	-	-	730	69	17	7										
Bedford-road	-	-	- ditto	-	-	-	-	-	824	93	10	11										
Queen and Webber-streets			- ditto	-	-	-	-	-	446	48	19	6										
Vassall-road	-	-	- ditto	-	-	-	-	-	62	13	3	6										
Joiner's-street	-	-	- ditto	-	-	-	-	-	134	14	13	9										
Sutherland-terrace	-	-	- ditto	-	-	-	-	-	912	95	6	9										
Upper Bland-street		-	- ditto	-	-	-	-	-	87	7	1	4										
Surrey Zoological Gardens			- ditto	-	-	-	-	-	258	31	10	–										
Paragon-road	-	-	- ditto	-	-	-	-	-	479	39	18	4										
Suffolk-street	-	-	- ditto	-	-	-	-	-	393	38	1	10										
Guildford-street	-	-	- ditto	-	-	-	-	-	342	42	14	6										
Jacob-street, Bermondsey			- ditto	-	-	-	-	-	338	28	15	2										
Brunswick-street	-	-	- ditto	-	-	-	-	-	314	40	7	10										
Ditto	-	-	-	2 new gullies	-	-	-	-	-	3	15	10										
Little Suffolk-street		-	1 - ditto	-	-	-	-	-	-	3	5	5										
Dover-place	-	-	-	pipe sewer	-	-	-	-	2,280	256	19	2										
										6	9	11										
Maltby-street	-	-	-	brick sewer	-	-	58		-	18	18	11										
Brunswick-court	-	-	-	pipe sewer	-	-	-	-	1,431	143	11	–										
Russell-place	-	-	-	arching	-	-	91		-	10	1	9										
Castle-street	-	-	-	pipe sewer	-	-	-	-	1,202	160	15	4										
John-street	-	-	-	pipe sewer and gullies		-	-		774	8	19	8										
										101	9	–										
Regent-street	-	-	-	- ditto	-	-	-	-	324	36	11	5										
High and King-streets		-	- ditto	-	-	-	-	-	3,942	418	15	8										
New Church-street		-	pipe sewer	-	-	-	-	-	767	69	9	5										
Clarence-street	-	-	- ditto	-	-	-	-	-	316	34	19	2										
Channel-row	-	-	- ditto	-	-	-	-	-	24	5	2	7										
Park-street	-	-	-	arching brick sewer	-		134		-	15	6	11										
Red Cross-street	-	-	pipe sewer	-	-	-	-	-	250	31	5	–										
Sussex-road	-	-	- ditto	-	-	-	-	-	115	8	6	2										
Clarence-place	-	-	- ditto	-	-	-	-	-	1,326	141	3	8										
Sutherland-terrace	-	-	4 new gullies	-	-	-	-	-	-	15	10	7										
Soap Suds-square	-	-	pipe sewer	-	-	-	-	-	415	49	2	7										
Lewellyn-grove	-	-	- ditto	-	-	-	-	-	202	25	8	5										
Church-street, Russell-street			5 new gullies	-	-	-	-	-	-	15	19	8										
George-row, Nutkin's-row			pipe sewer	-	-	-	-	-	1,181	408	12	9										
Various localities	-	-	private drains, &c.	-	-	-	-	-	-	69	–	11										
Ditto	-	-	-	- ditto	-	-	-	-	-	47	4	9										
Ditto	-	-	-	-	-	-	-	-	-	90	5	9										
Ditto	-	-	-	repairs, sewers, &c.	-	-	-	-	-	-	-	-	90	15	9							
Ditto	-	-	-	-	-	-	-	-	-	-	-	-	80	10	2							
Ditto	-	-	-	-	-	-	-	-	-	-	-	-	148	–	8							
Ditto	-	-	-	flushing, cleansing, &c.	-	-	-	-	-	-	-	-	-	-	-	203	3	2				
Ditto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	280	5	9				
Ditto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	413	10	–				
				Incidental works	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	1	10	
				Ditto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	15	11	
				Ditto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	19	2	

(continued)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
SURREY and KENT—*contd.*	Larkhall-lane	improvement work	- -	- -	13 17 1				
	Paragon-row	- ditto	- -	- -	23 18 3				
	Brook-terrace	- ditto	- -	- -	8 18 9				
	Various	urinals	- -	- -	12 13 9	319 6 7	896 18 11	28 16 11	4,715 11 5
	Sussex-road	pipe sewer	- -	128	9 14 11				
	Staple-street	2 new gullies	- -	- -	4 2 11				
	Francis-street	2 - ditto	- -	- -	3 14 11				
	Duke-street	1 - ditto	- -	- -	2 15 2				
	High-street, Newington	1 - ditto	- -	- -	2 2 10				
	Mermaid-court	1 - ditto	- -	- -	3 1 5				
	Lansdown-place	pipe sewer	- -	246	19 8 10				
	Brewers Turning Vineyard	- ditto	- -	88	9 7 8				
	Ewer-street	- ditto	- -	157	18 8 7				
	Mansion House-street	- ditto and 1 gully	- -	120	14 5 6				
	Salisbury-row	1 new gully	- -	- -	3 6 7				
	New Cross-road	2 - ditto	- -	- -	8 18 6				
	Deptford, Lower-road	1 - ditto	- -	- -	4 13 5				
	Blue Anchor-road	3 - ditto	- -	- -	16 14 5				
	Chester-street	pipe sewer	- -	125	14 5 3				
	Guildford-street	- ditto	- -	190	17 12 9				
	Mill-street	1 new gully	- -	- -	3 7 3				
	Camberwell New-road	1 air shaft	- -	- -	9 9 -				
	Joiner's-street	3 new gullies	- -	- -	9 19 7				
	Old Kent-road	1 new gully	- -	- -	4 12 7				
	Gainsford-street	pipe sewer	- -	815	137 14 2				
	Church-street, Lambeth	- ditto	- -	63	13 5 2				
	Adams' Timber-yard	- ditto	- -	813	106 4 1				
	Harrow-road-street, Borough.	- ditto	- -	138	14 1 3				
	Little Queen-street	- ditto	- -	106	9 5 4				
	Shepherd's-lane, Brixton	- ditto	- -	1,284	217 5 1				
	Various localities	private drains, &c.	- -	- -	71 8 -	64 5 3	238 - 5	10 19 7	
	Ditto	- ditto	- -	- -	98 6 -	67 12 7	236 1 7	2 - 4	

Ditto - - -	- ditto - - -	- - -	- -	143 12 8	107 8 9	472 18 4	27 1 11			
Springfield-terrace -	improvement works - - -	- -	- -	18 8 10	—	—	—	2,236 1 5		
Crosier-street - -	pipe sewer - - -	- -	130	18 6 8						
Rockingham-court -	- ditto - - -	- -	74	9 5 –						
Willow-walk - - -	- ditto - - -	- -	80	7 4 2						
Red Cross-street - -	- ditto - - -	- -	42	4 19 10						
Pleasant-place - -	- ditto - - -	- -	646	75 10 –						
Church-street - -	1 new gully - - -	- -	- -	5 11 7						
Portland-place - -	1 - ditto - - -	- -	- -	5 1 8						
Union-street - - -	1 - ditto - - -	- -	- -	2 13 –						
Earl-street - - -	1 - ditto - - -	- -	- -	3 2 –						
Dockhead - - -	pipe sewer - - -	- -	529	75 5 2						
Victoria-road - - -	- ditto - - -	- -	185	30 9 6						
Tooley-street - - -	4 new gullies - - -	- -	- -	14 19 10						
Little Suffolk-street -	2 - ditto - - -	- -	- -	7 7 6						
Sun-street - -	1 - ditto - - -	- -	- -	3 10 8						
South Lambeth, by toll -	1 - ditto - - -	- -	- -	3 – 7						
Swan-street - - -	pipe sewer - - -	- -	404	39 10 4						
Webber-street - -	1 new gully - - -	- -	- -	2 17 –						
Gravel-lane - - -	1 - ditto - - -	- -	- -	4 4 1						
Edward-street - -	pipe sewer - - -	- -	51	7 14 –						
Three Crown-square -	- ditto - - -	- -	100	18 8 9						
Fair-street - - -	- ditto - - -	- -	416	36 5 6						
Hitchman's Folly - -	- ditto - - -	- -	90	10 8 8						
Brixton-road - - -	6 new gullies - - -	- -	- -	32 9 11						
Various localities - -	private drains, &c. - - -	- -	- -	52 2 2	37 17 3	223 14 8	1 9 2			
Ditto - - -	- ditto - - -	- -	- -	86 2 8	56 8 11	306 5 11	2 9 10			
Ditto - - -	- ditto - - -	- -	- -	113 3 4	166 5 11	565 10 6	9 7 4	2,035 3 1		
Wickham-street - -	pipe sewer - - -	- -	94	8 4 11						
Various localities - -	private drains, &c. - - -	- -	- -	{ 38 9 1 / 35 3 8	{ 31 15 6 / 30 12 5	230 12 1	7 8 4			
St. George's Circus -	new gully - - -	- -	- -	2 12 8						
Stockwell-crescent -	pipe sewer - - -	- -	240	19 – 11						
By Vitriol Factory, Battersea.	new gully - - -	- -	- -	3 4 3						
Camberwell-road - -	- ditto - - -	- -	- -	3 7 9	—	—	—	410 11 7		
Cornbury-street - -	pipe sewer - - -	- -	140	12 2 –						
Westminster-road - -	side entrance - - -	- -	- -	35 10 8						
Three Crown-square -	pipe sewer - - -	-	10	1 7 6						
White Lion-court - -	- ditto - - -	- -	104	11 2 1						
Vine-street - - -	- ditto - - -	- -	100	7 7 2						
High-street, Borough -	1 new gully - - -	- -	- -	4 6 3						
Victory-place - - -	1 - ditto - - -	- -	- -	2 18 4						
Loman-street - - -	pipe sewer - - -	- -	100	10 6 5						
Jacob-street - - -	- ditto - - -	- -	56	6 16 7						
Fenteman-street - -	- ditto - - -	- -	104	9 1 –						
North-street - - -	1 new gully - - -	- -	- -	3 10 2						

(continued)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Surrey and Kent—*cont^d.*	Polygon-buildings	pipe sewer	- -	80	7 2 10				
	Carlisle-street	ditto	- -	218	19 13 4				
	Waterloo-road	2 new gullies	- -	- -	7 10 -				
	St. George's Circus	1 ditto	- -	- -	2 16 11				
	Keppel-street	pipe sewer	- -	52	5 5 1				
	Bolton-street	1 new gully	- -	- -	3 13 6				
	Little James-street	pipe sewer	- -	80	20 1 1				
	Opposite 12, Chepstow-place.	1 new gully	- -	- -	3 6 8				
	Lower Deptford-road	2 new gullies	- -	- -	10 4 1				
	John-street	pipe sewer	- -	396	52 6 2				
	Wandsworth-road	brick sewer	120	- -	25 6 8				
	Kennington-green	ditto	160	- -	40 3 2				
	Marshall-street	pipe sewer	- -	102	11 3 2				
	Blue Anchor-road	5 new gullies	- -	- -	40 14 4				
	High-street, Peckham	1 new gully	- -	- -	6 11 11				
	Lower Deptford-road	1 ditto	- -	- -	4 18 8				
	Wellington-place	pipe sewer	- -	96	5 17 11				
	Winchester-place	brick sewer	164	- -	25 8 4				
	Various localities	private drains, &c.	- -	- -	17 7 -	20 - 4	102 14 6	3 11 -	
	Ditto	ditto	- -	- -	78 7 11	65 16 7	314 6 5	11 17 -	
	Ditto	ditto	- -	- -	96 19 2	85 3 3	531 11 3	12 1 3	
									1,736 7 8
	Ditto	supervision	- -	- -	- - -	- - -	- - -	1,340 13 8	
	Ditto	wages, incidental	- -	- -	- - -	- - -	10 19 10	3 4 4	
	Mr. Truscot, Gainsford-street.	compensation	- -	- -	- - -	- - -	- - -	102 - -	
	Lambeth Waterworks (Elephant and Castle, &c.)	water supplied to urinals.	- -	- -	- - -	- - -	- -	40 - -	
	Various localities	repairing roadways	- -	- -	- - -	- - -	- - -	9 11 1	
	Ditto	sluice-keepers	- -	- -	- - -	- - -	- - -	366 18 -	
	Cullem, Westminster-road	compensation	- -	- -	- - -	- - -	- - -	10 - -	
	Southwark and Vauxhall Water Company.	water supplied	- -	- -	- - -	- - -	161 1 5		
	Elephant and Castle, &c.	gas supplied	- -	- -	- - -	- - -	- - -	14 13 -	

	Advertisements - -	- - - - - -	- -	- -	- - -	- - -	- - -	7 2 -	2,073 2 8	
	Wilson-street, New-Cross	difference of cost in pipe sewer.	- -	- -	6 19 4					
			2,067	39,763					£. 16,887 11 8	
GREENWICH - -	RavensbourneContract,No.1	brick sewer - -	500	- -	561 - -					
	London-street, &c. - -	brick and pipe sewer -	712	2,856	876 4 6					
	Billingsgate-street, &c. -	brick sewers - -	1,200	- -	784 13 5					
	Croom's-hill - - -	brick sewer - -	1,000	- -	396 - -	—	—	—	2,617 17 11	
	Various localities - -	private drain, &c. -	- -	- -	2 11 -	54 1 9	42 9 3	- 2 6	99 4 6	
						18 6	3 18 9	—	4 17 3	
	Chester-street - - -	2 new gullies - -	- -	- -	7 16 6					
	Various localities - -	repairs, cleansing, &c. -	- -	- -	- - -	79 6 3	16 13 9	- 8 -	104 4 6	
	East-street, Greenwich -	pipe sewer - - -	- -	771	217 16 10					
	Ditto - - - -	side entrance - -	- -	- -	16 6 4					
	Billingsgate Dock, &c. -	brick sewer (*see* above)	- -	- -	7 1 5					
	Various localities - -	private drains, &c. -	- -	- -	2 15 -	3 6 -	24 5 10	- 4 10	271 16 3	
	Marsh-lane - - -	2 new gullies - -	- -	- -	5 17 9					
	Various localities - -	private drains, &c. -	- -	- -	3 10 11	63 1 5	19 15 10	- 1 8	92 7 7	
	Ditto - - - -	repairs, &c. - -	- -	- -	- - -	3 2 2	- 13 9	1 15 4	5 11 3	
	Ditto - - - -	private drains, &c. -	- -	- -	2 10 6	- 13 10	7 6 2	- 8 8	10 19 2	
	Ditto - - - -	supervision, &c. - -	- -	- -	- - -	- - -	- - -	307 11 9		
	Ravensbourne Contract -	compensation - -	- -	- -	- - -	- - -	- - -	25 - -	332 11 9	
			3,412	3,627					£. 3,539 10 2	
WANDLE - - -	Various localities - -	private drains, &c. -	- -	- -	2 18 -	25 4 -	43 4 11	- 13 4		
	Ditto - - - -	supervision - - -	- -	- -	- - -	- - -	- - -	41 16 6	113 16 9	
FULHAM, &c. - -	Starch-green - - -	brick sewer and 1 gully	173	- -	196 9 2					
	Albion-road - - -	pipe sewer - - -	- -	90	15 8 10					
	Various localities - -	private drains, &c. -	- -	- -	4 13 9	7 14 10	108 15 7	6 - 6	339 2 8	
	Ditto - - - -	- ditto - - -	- -	- -	2 14 3	17 5 4	108 9 11	38 18 -	167 7 6	
	Elm-grove - - -	pipe sewer - - -	- -	608	50 - -	—	—	—	50 - -	
	Various localities - -	private drains - -	- -	- -	2 15 1	4 16 2	18 8 6	1 11 1	27 10 10	
	Elm-grove - - -	4 new gullies - -	- -	- -	4 10 -					
	Garden-row - - -	1 new gully - -	- -	- -	1 16 11					
	Vale's-place and John's-place.	2 new gullies - -	- -	- -	7 10 3					
	Various localities - -	private drains, &c. -	- -	- -	5 17 5	- 15 9	72 12 -	4 - 6	97 2 10	

(*continued*)

Enclosure No. 1, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
FULHAM, &c.—*continued* -	Turnham-green - -	pipe sewer - -	- -	184	27 16 6	—	—	—	
	Various localities - -	private drains, &c. -	- -	- -	5 16 6	2 14 -	69 17 -	1 10 -	107 14 -
	Ditto - - - -	wages - - -	- -	- -	- - -	- - -	1 1 6	—	1 1 6
	Ditto - - - -	supervision - -	- -	- -	- - -	- - -	- - -	141 5 11	141 5 11
			173	882				£.	931 5 3
RAVENSBOURNE -	Ravensbourne Contract, No. 1	brick sewer, &c. - -	2,800	- -	2,977 - -				
	Sydenham - - -	ditto - - -	500	- -	160 12 4				
	Dacre-street, &c. - -	pipe sewer - - -	- -	1,210	240 - -				
	Lee-road - - -	brick sewer - -	2,200	- -	2,000 - -	—	—	—	5,377 12 4
	Various localities - -	incidental works - -	- -	- -	- - -	- - -	- - -	8 7 11	8 7 11
	Ditto - - -	flapping gullies, &c. -	- -	- -	1 5 2	10 4 2	1 - 10	- 19 2	13 9 4
	Ditto - - -	cleansing, &c. - -	- -	- -	- - -	- - -	- 7 6	- 3 2	- 10 8
	Ditto - - -	repairs, &c. - -	- -	- -	2 18 5	3 16 9	2 19 6	—	9 14 8
	Ditto - - -	flapping-house and gully drains, &c.	- -	- -	10 2 7	- - -	2 14 2	1 1 4	13 18 1
	Sydenham - - -	pipe sewer - - -	- -	182	13 13 -				
	Various localities - -	cleansing, &c. - -	- -	- -	- - -	- - -	1 4 7	- 1 8	14 19 3
	Lewisham-road - -	1 new gully - -	- -	- -	4 8 4				
	Various localities - -	cleansing, &c. - -	- -	- -	- - -	- - -	7 5 5	- 10 6	12 4 3
	Ditto - -	supervision - -	- -	- -	- - -	- - -	- - -	182 5 6	182 5 6
			5,500	1,392				£.	5,633 2 -

RICHMOND	Town of Richmond	pipe sewers	—	10,000	800 – –	—	—	—	800 – –
	Rose-cottage-lane	ditto			5 1 6				
	Black Horse-lane	ditto		300	24 2 6				
	Various localities	repairs, &c.			– – –	4 17 3	2 – –	– 19 7	37 – 10
	King-street	new gully			2 16 7				
	Red Lion-street	ditto			2 9 1				
	Vine-yard	pipe sewer		133	13 11 –				
	Artichoke-lane	ditto		214	18 19 7				
	Water-lane	ditto		24	2 1 9				
	Various localities	repairs, &c.			– – –	22 15 10	5 9 3	2 17 3	71 – 4
	*Hill-street	1 side entrance			7 17 1				
	Various localities	private drains, &c.			3 1 6	8 19 8	12 11 3	– 13 4	33 2 10
	*Hill-street	side entrance			1 5 3				
	Queen's-road	air shaft			3 11 8				
	Various localities	private drains, &c.			8 6 7	2 – 7	15 18 2	22 2 1	53 4 4
	Ditto	ditto			1 6 –	– 3 3	10 16 6	—	12 5 9
	Ditto	ditto			1 14 3	5 17 11	39 14 6	– 3 6	47 10 2
	Wallington-yard	compensation			– – –	– – –	– – –	6 – –	6 – –
	Various localities	supervision			– – –	– – –	– – –	27 6 6	27 6 6
			—	10,671				£.	1,087 10 9
MORTLAKE	In the District	coach-hire			– – –	– – –	– – –	– 8 8	– 8 8
BARNES	In the District	coach-hire			– – –	– – –	– – –	– 4 4	– 4 4
BOW and BROMLEY	Various localities	private drains, &c.			2 15 –	– 18 2	1 16 11	5 11 5	11 1 6

Enclosure No. 2, with No. 11.

SUMMARY.

DISTRICT, &c.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
	Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
	Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Counter's Creek	644	1,485	837 17 7	361 9 11	329 16 11	403 8 7	1,932 13 –
Ranelagh	1,148	5,349	2,342 2 3	316 10 7	917 7 5	808 11 6	4,384 11 9
Western	1,817	511	3,171 18 7	5,240 7 2	1,817 4 6	4,372 3 1	14,601 13 4
Regent-street	–	–	369 15 2	44 13 7	344 – 11	156 16 5	915 6 1
Eastern	584	1,876	1,861 17 4	2,303 14 10	1,178 – 2	2,416 2 9	7,759 15 1
Holborn	4,166	2,553	4,000 11 3	507 19 9	1,129 7 6	796 18 11	6,434 17 5
Finsbury	5,658	2,556	4,159 14 7	331 15 9	1,230 8 4	972 8 11	6,694 7 7
Spitalfields, &c.	333	1,808	1,119 12 3	838 13 3	1,828 15 5	575 1 8	4,362 2 7
Hackney Brook	1,050	265	651 6 9	420 14 9	2,796 19 2	100 12 2	3,969 12 10
Lower Wapping	–	–	29 9 9	38 10 11	62 3 1	17 10 4	147 14 1
Limehouse	–	–	16 7 9	5 1 2	9 1 9	9 8 8	39 19 4
Upper Limehouse	–	–	–	21 17 4	4 4 8	5 18 3	32 – 3
Tower Hill	–	–	3 12 –	1 1 –	– 4 8	12 15 6	17 13 2
Hermitage-street	–	–	1 – –	25 19 11	22 4 3	9 14 9	58 18 11
Saint Katherine's	–	–	–	–	–	6 13 8	6 13 8
Poplar and Blackwall	53	–	53 15 –	88 16 9	308 – –	98 – 6	548 12 3
Surrey and Kent	976	25,772	5,823 5 2	1,645 6 7	4,713 11 10	2,012 5 –	14,194 8 7
Greenwich	3,850	5,361	3,535 3 8	103 12 4	84 13 8	335 11 4	4,059 1 –
Wandle	–	–	–	1 7 9	63 5 2	42 9 5	107 2 4
Fulham and Hammersmith	–	992	170 8 6	557 7 6	279 2 1	150 2 3	1,157 – 4
Ravensbourne	4,282	2,726	4,811 4 6	216 11 3	57 11 3	186 18 5	5,272 5 5
Richmond	–	–	45 15 6	24 19 3	119 15 2	56 11 1	247 1 –
Mortlake	–	–	–	–	–	– 8 8	– 8 8
Barnes	–	–	–	–	–	– 4 4	– 4 4
Bow and Bromley	–	–	3 12 –	3 4 –	1 13 5	5 14 5	14 3 10
TOTAL £.	24,561	51,254	33,008 9 7	13,099 15 4	17,297 11 4	13,552 10 7	76,958 6 10

(signed) *Wm Lavers*,
Clerk of Surveyors' and Contractors' Accounts.

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
COUNTER'S CREEK	Portland-road	air shaft	-	-	– 9 4				
	Portobello-lane	brick sewer	38	-	15 17 10				
	Wood-lane	pipe sewer	-	14	2 16 2				
	Uxbridge-road	ditto	-	86	15 5 8				
	East Crescent-mews	3 new gullies	-	-	10 2 9				
	Pembridge-mews	3 - ditto	-	-	8 11 –				
	Pottery-lane	4 - ditto	-	-	19 3 11				
	William-street	1 - ditto	-	-	3 15 7				
	James-street	2 - ditto	-	-	7 17 7				
	John's-terrace, Notting-hill	3 - ditto	-	-	13 5 11				
	Clarendon-road	1 - ditto	-	-	4 19 –				
	Kensington Park-crescent	1 - ditto	-	-	4 9 10				
	North-street	4 - ditto	-	-	13 – 5				
	St. James-square	2 - ditto	-	-	7 11 3				
	Pembridge Villa-road	1 - ditto	-	-	4 5 3				
	Kensington Park-terrace	2 - ditto	-	-	11 5 9				
	St. James-square	2 - ditto	-	-	7 6 5				
	Drayton-grove	1 - ditto	-	-	4 16 4				
	Kensington Park-road	2 - ditto	-	-	8 5 9				
	Lindsey-road	pipe sewer	-	48	6 12 5				
	Pembroke-road	2 new gullies	-	-	12 12 –				
	South-row	1 - ditto	-	-	3 5 11				
	Drayton-grove	2 - ditto	-	-	8 8 6				
	High-street, Notting-hill	1 - ditto	-	-	6 6 4				
	Park walk	2 - ditto	-	-	5 4 11				
	High-row, Kensall green	pipe sewer	-	610	53 19 8				
	Ladbroke-road	side entrance	-	-	25 18 2				
	Camden-house Estate	6 new gullies	-	-	31 10 2				
	Portobello-lane	air shaft and gullies	-	-	2 1 6				
	Harrow-road	pipe sewer	-	727	61 15 1				
	Uxbridge-road	2 new gullies	-	-	16 13 5				

(*continued*)

Enclosure No. 2, with No. 11—*continued.*

DISTRICT	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
COUNTER'S CREEK—*cont^d* -	Portland-road - -	2 new gullies - -	- -	- -	8 8 5				
	Camden-grove - -	3 - ditto - - - -	- -	- -	11 16 7				
	Weller-street - - -	brick sewer and air shaft	606	- -	300 - -				
	Various localities - -	private drains, &c. -	- -	- -	119 18 9	361 9 11	329 16 11	151 8 1	252 - 6
	Various - - - -	- - - - - -	- -	- -	- - -	- - -	- - -	252 - 6	1,680 12 6
			644	1,485	837 17 7			£.	1,932 13 -
RANELAGH - - -	Caversham-street - -	pipe sewer, gullies, &c.	- -	1,457	283 17 10				
	Great James-street - -	brick sewer, &c. - -	370	- -	187 8 4				
	Chapel-street - - -	brick and pipe sewers, &c.	74	839	231 16 6				
	Prince's-gate - - -	3 new gullies - -	- -	- -	12 1 5				
	Wellington-square - -	7 - ditto - - -	- -	- -	30 12 9				
	Smith's-terrace - -	2 - ditto - - -	- -	- -	9 4 6				
	Chapel-place - - -	1 - ditto - - -	- -	- -	3 19 -				
	Onslow-crescent - -	4 - ditto - - -	- -	- -	10 13 -				
	Winchester-row - -	1 - ditto - - -	- -	- -	3 - 8				
	Abbey-road - - -	2 - ditto - - -	- -	- -	7 19 5				
	Orsett-place - - -	3 - ditto - - -	- -	- -	17 8 7				
	Charles-street, Paddington	1 - ditto - - -	- -	- -	3 19 -				
	Clifton-road - - -	side entrance, &c. -	- -	- -	3 6 -				
	Hereford-square - -	3 new gullies - -	- -	- -	11 7 3				
	Ranelagh-grove - -	1 - ditto - - -	- -	- -	3 15 7				
	Gloucester-grove - -	6 - ditto - - -	- -	- -	6 15 1				
	Clough's-cottage - -	1 - ditto - - -	- -	- -	1 2 6				
	Vincent-street - - -	2 - ditto - - -	- -	- -	1 6 11				
	Carlton-road - - -	2 - ditto - - -	- -	- -	11 14 3				
	Manor-street - - -	pipe sewer and gullies -	- -	639	139 9 7				
	Lyon's-mews - - -	1 new gully - -	- -	- -	9 8 6				
	Pickering-mews - -	1 - ditto - - -	- -	- -	6 12 2				
	James-place - - -	6 - ditto - - -	- -	- -	24 13 7				
	Westbourne-terrace - -	1 - ditto - - -	- -	- -	4 10 1				
	Bark-place - - -	1 - ditto - - -	- -	- -	1 3 -				

Gloucester-terrace	8 new gullies					42	11	1							
Delamere-street	3 - ditto					23	13	3							
Wilton-crescent	1 - ditto					3	9	4							
Paddington-green	1 air shaft					2	19	6							
Montpelier-square	1 new gully					3	19	7							
Cheyne-walk	2 - ditto					11	13	1							
Oxford-square	1 air shaft					3	8	–							
Upper Ebury-street, &c.	7 - ditto					1	6	6							
						4	7	11							
Devonshire-terrace	2 new gullies					8	2	5							
Hyde-park Gardens Mews	pipe sewer			68		10	19	9							
Hamilton-terrace	1 new gully					3	11	6							
Portsdown-road	2 - ditto					9	5	1							
Warwick-court	6 - ditto					21	15	6							
Chichester-street	1 - ditto					4	10	8							
Westbourne-terrace	2 - ditto					17	6	1							
Randolph-road	1 - ditto					8	17	5							
Kilburn, by Brewery	pipe sewer			176		28	12	9							
Frognal, Hampstead	brick sewer	180				42	6	8							
Cheltenham-terrace	1 air shaft					1	13	9							
James-street	pipe sewer and gullies			72		30	3	5							
Thurloe-place, West	1 air shaft					1	14	8							
Warwick-road	1 new gully					6	12	1							
Crescent-place	1 air shaft					1	–	8							
Eaton-place	1 - ditto					1	–	10							
King's-road	1 - ditto					1	17	3							
Gloucester-grove, West	2 new gullies					7	1	4							
St. Leonard's-terrace	1 air shaft					–	19	8							
Walpole-street	1 - ditto					1	15	10							
Green-street	1 - ditto					–	17	1							
Royal Avenue-terrace	1 - ditto					1	6	5							
Caroline-place	pipe sewer and gullies			926		30	13	–							
						174	6	3							
Hyde-park-gate, South	ditto			558		124	2	2							
Stanley-street	6 new gullies					29	6	1							
Wellesley-grove	pipe sewer and gully			282		53	7	1							
Kilburn, by Brewery	pipe sewer			242		67	–	2							
Inverness-place	1 new gully					6	2	4							
Cleveland-square	2 - ditto					8	–	8							
Devonshire-terrace	3 - ditto					12	1	1							
Charles-street	1 - ditto					3	14	1							
Capland-street	pipe sewer			90		12	7	4							
Connaught-terrace	brick sewer and air shaft	524				240	9	4							
Cottage-place	1 new gully					2	1	10							
Various localities	private drains, &c.					217	13	4	316	10	7	917	7	5	177 6 2
															631 5 4
Portsdown-place	2 new gullies					8	3	11							3,753 6 5
Carlysle-street	1 side entrance					16	9	–							
		1,148		5,349		2,342	2	3							£. 4,384 11 9

Enclosure No. 2, with No. 11—*continued*.

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
WESTERN	Abingdon-street	2 new gullies	–	–	12 6 10				
	Carlisle-street	2 - ditto	–	–	10 10 10				
	Devonshire-mews	2 - ditto	–	–	9 1 10				
	Hayes-mews	2 - ditto	–	–	9 12 1				
	Hertford-street	2 - ditto	–	–	9 9 6				
	James-street	1 side entrance	–	–	8 18 8				
	Old Palace-yard	3 new gullies	–	–	27 13 3				
	Tatchbrook-street	1 - ditto	–	–	3 8 10				
	Ashley-street	2 - ditto	–	–	10 1 2				
	Broad Sanctuary	2 - ditto	–	–	14 19 9				
	Horse and Groom Yard	1 - ditto	–	–	1 7 6				
	Morpeth-place	3 - ditto	–	–	16 14 8				
	Carlisle-street	7 - ditto	–	–	41 14 1				
	Vauxhall-road	2 - ditto	–	–	15 10 2				
	Carteret-street	pipe sewer	–	334	86 5 3				
	Gloucester-street	4 new gullies	–	–	23 7 11				
	St. George's-road	6 air shafts	–	–	36 3 10				
	Charlwood-street	4 new gullies	–	–	26 3 3				
	Sussex-street	2 - ditto	–	–	15 2 9				
	Clarendon-street	2 - ditto	–	–	11 18 10				
	Hanover-street	6 - ditto	–	–	35 10 5				
	Warwick-square	4 - ditto	–	–	21 6 1				
	Albion-terrace	1 - ditto	–	–	6 13 5				
	Rochester-row	2 - ditto	–	–	10 – 7				
	Stratton Ground	1 air shaft	–	–	4 4 6				
	Rochester-row	1 - ditto	–	–	3 11 –				
	King's Head Yard	1 new gully	–	–	6 7 6				
	Broad Sanctuary	1 - ditto	–	–	5 1 1				
	Victoria-street	1 - ditto	–	–	6 10 5				
	Hereford-street	2 - ditto	–	–	8 13 –				
	Carlysle-street	1 air shaft	–	–	1 2 8				
	Broad Sanctuary	1 new gully	–	–	5 13 –				
	Great Peter-street	1 air shaft	–	–	2 11 4				
	Wyndham-place	1 - ditto	–	–	3 11 5				
	Charlwood-street	1 new gully	–	–	5 19 5				

	Eccleston-place	1 air shaft				3 17 –				
	Grosvernor-place	1 new gully				6 6 1				
	Ponsonby-street	2 - ditto				13 13 11				
	Chapel-place	1 - ditto				7 17 7				
	Abingdon-street	1 - ditto				8 11 –				
	Old Palace-yard	1 - ditto				12 13 2				
	Marylebone-lane	1 air shaft				5 3 –				
	New-street, Portland-town	5 new gullies				24 5 4				
	Wood-street, Westminster	1 air shaft				4 11 10				
	Dorset-square	1 - ditto				4 1 3				
	Brewer's-green	1 new gully				4 13 10				
	Princes-street	1 - ditto				2 15 11				
	Wilton-place	2 - ditto				9 9 3				
	Barlow-mews	3 - ditto				9 19 2				
	Charles-street	1 air shaft				3 14 7				
	Clarence-gate, Regent's-park	1 side entrance				47 18 1				
	King-street, Westminster	1 air shaft				4 18 8				
	St. George's-square	2 - ditto				16 6 5				
	Whitehall-gardens	2 new gullies				19 8 8				
	Chapter-street	4 - ditto				17 12 6				
	Queen Anne's Mews	pipe sewer			108	18 8 7				
	King-street	1 air shaft				4 16 9				
	Victoria-street	2 new gullies				12 2 2				
	Great Cumberland-mews	pipe sewer			34	5 12 5				
	St. George's-square	4 air shafts				34 5 –				
	Pulford-street	2 - ditto				8 19 3				
	Upper Garden-street	1 - ditto				3 – 4				
	Vauxhall Bridge-road	1 - ditto				2 2 3				
	Lower Belgrave-street	2 - ditto				5 7 10				
	Lillington-street	1 - ditto				4 2 3				
	Market-street, May-fair	2 new gullies				8 6 8				
	Pulford-street	1 side entrance				37 16 10				
	Victoria-street	27 new gullies				179 14 8				
	Tothill-street	bricks and pipe sewer, &c.	980		35	1,321 19 8				
	New-street Mews	brick sewer and air shaft	677			435 17 2				
	York-street	brick sewer	160			160 – –				
	Various localities	private drains, &c.				184 2 8	5,240 7 2	1,817 4 6	4,372 3 1	14,601 13 4
			1,817		511	3,171 18 7				
REGENT-STREET	Cockspur-street	side entrance				299 2 3				
	Waterloo-place	1 new gully				21 7 3				
	B.-mews, York-terrace	1 - ditto				13 5 –				
	Park-road	1 - ditto				8 9 8				
	Various localities	private drains, &c.				27 11 –	44 13 7	344 – 11	156 16 5	915 6 1

Enclosure No. 2, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
EASTERN - - -	Church-lane - - -	brick and pipe sewers, &c. &c.	584	1,189	791 2 6				
	Great Windmill-street -	brick sewer - -	- -	- -	458 – 1				
	Queen's Head Yard - -	pipe sewer and gullies -	- -	80	26 12 3				
	King-street, St. James -	2 air shafts - -	- -	- -	8 – –				
	Church-street, St. Giles -	3 new gullies - -	- -	- -	12 1 9				
	White Horse Yard - -	pipe sewer - - -	- -	197	51 8 6				
	Macclesfield-street - -	1 air shaft - - -	- -	- -	3 15 2				
	Arthur-street - - -	3 new gullies - -	- -	- -	14 18 6				
	Southampton-street -	pipe sewer and gully -	- -	120	25 18 6				
	Buckingham-street - -	pipe sewer - - -	- -	40	10 13 5				
	Shire-lane - - -	1 new gully - -	- -	- -	3 16 1				
	Coal-yard, Drury-lane -	1 - ditto - - -	- -	- -	4 6 7				
	Crown-court, Strand -	pipe sewer - - -	- -	208	48 – 8				
	Sheffield-street - -	1 air shaft - - -	- -	- -	2 18 –				
	Wellington-street - -	1 new gully - -	- -	- -	5 – 4				
	Turner's-court, St. Martin's-lane.	1 - ditto - - -	- -	- -	9 5 4				
	Oxford-market - -	pipe sewer - - -	- -	42	10 5 1				
	16 & 26, Church-lane -	improvement works -	- -	- -	16 16 8				
	27, 15 & 17, Church-lane	- - ditto - -	- -	- -	29 1 8				
	9, 10 & 11, George-street	- - ditto - -	- -	- -	18 10 2				
	4 & 5, Welsh's-court -	- - ditto - -	- -	- -	20 11 4				
	Hampshire Hog-yard -	- - ditto - -	- -	- -	10 – 2				
	2 & 3, Fletchers'-court -	- - ditto - -	- -	- -	21 4 9				
	4, 5 & 7, Kennedy's-court	- - ditto - -	- -	- -	32 10 8				
	2, 10, 3, 11, 4, 12 & 13, Carrier-street.	- - ditto - -	- -	- -	70 7 11				
	34, Great St. Andrew's-street.	- - ditto - -	- -	- -	15 2 4				
	7, Crown-court, Soho -	- - ditto - -	- -	- -	7 15 7				
	16, Drury-court - -	- - ditto - -	- -	- -	10 7 1				
	Various localities - -	private drains, &c. -	- -	- -	123 6 3	2,303 14 10	1,178 – 2	2,416 2 9	7,759 15 1
			584	1,876	1,861 17 4				

HOLBORN - - -

New-road - -	-	1 new gully	-	-	-	-	-	-	-	-	4	10	7
Bell-court -	-	1 - ditto -	-	-	-	-	-	-	-	-	8	19	2
Oakley-square -	-	2 - ditto -	-	-	-	-	-	-	-	-	9	3	8
Liquorpond-street -	-	pipe sewer, &c.	-	-	-	-	154	-	-	-	35	18	4
Percy-street -	-	1 new gully	-	-	-	-	-	-	-	-	3	19	10
Maldon-road -	-	3 - ditto -	-	-	-	-	-	-	-	-	13	9	3
Mansfield-place -	-	pipe sewer -	-	-	-	-	58	-	-	-	10	2	9
Charlton-street -	-	2 new gullies	-	-	-	-	-	-	-	-	9	4	6
Rochester-square -	-	2 - ditto -	-	-	-	-	-	-	-	-	7	6	—
Haverstock-street -	-	1 - ditto -	-	-	-	-	-	-	-	-	3	2	1
Oval-road -	-	1 - ditto -	-	-	-	-	-	-	-	-	3	9	2
Charrington-street -	-	1 - ditto -	-	-	-	-	-	-	-	-	9	16	4
Queen's-road -	-	5 - ditto -	-	-	-	-	-	-	-	-	21	8	3
Fitzroy-road -	-	1 - ditto -	-	-	-	-	-	-	-	-	6	5	6
Three Cups Yard -	-	1 - ditto -	-	-	-	-	-	-	-	-	3	9	10
Queen's-road -	-	2 - ditto -	-	-	-	-	-	-	-	-	9	—	9
Chalcot-place -	-	4 - ditto -	-	-	-	-	-	-	-	-	17	9	10
Skinner-street -	-	2 - ditto -	-	-	-	-	-	-	-	-	7	9	1
Diana-place -	-	1 air shaft -	-	-	-	-	-	-	-	-	1	3	2
West-street, Somers-town	-	pipe sewer -	-	-	-	-	149	-	-	-	50	15	9
Robert's-mews -	-	ditto - -	-	-	-	-	364	-	-	-	75	19	3
Prince of Wales Road	-	brick sewer -	-	-	237	-	-	-	-	-	121	19	6
Skinner-street -	-	ditto - -	-	-	162	-	-	-	-	-	79	14	11
Church-road -	-	1 new gully	-	-	-	-	-	-	-	-	3	8	8
Agar-town -	-	1 - ditto -	-	-	-	-	-	-	-	-	5	2	9
Downshire-hill -	-	pipe sewer -	-	-	-	-	236	-	-	-	29	4	1
Spanish-place -	-	1 new gully	-	-	-	-	-	-	-	-	5	6	7
Diana-place -	-	1 - ditto -	-	-	-	-	-	-	-	-	3	9	8
Gloucester-road -	-	2 side entrances	-	-	-	-	-	-	-	-	36	10	4
Took's-court -	-	3 new gullies	-	-	-	-	-	-	-	-	11	8	7
Old St. Pancras Road	-	1 - ditto -	-	-	-	-	-	-	-	-	3	12	7
Great James-street -	-	2 - ditto -	-	-	-	-	-	-	-	-	5	10	5
Church-row -	-	1 - ditto -	-	-	-	-	-	-	-	-	4	1	—
Rochester-terrace and Road	-	7 - ditto -	-	-	-	-	-	-	-	-	31	9	10
Chesnut-buildings -	-	1 - ditto -	-	-	-	-	-	-	-	-	5	11	8
Princes-terrace -	-	2 - ditto -	-	-	-	-	-	-	-	-	8	15	8
King's-road -	-	brick sewer, &c.	-	-	318	-	-	-	-	-	232	15	7
Grafton-road -	-	1 air shaft -	-	-	-	-	-	-	-	-	—	10	7
Stratford-place -	-	1 new gully	-	-	-	-	-	-	-	-	3	19	6
High-street, Camden-town	-	1 - ditto -	-	-	-	-	-	-	-	-	6	19	6
Brook-street - -	-	1 - ditto -	-	-	-	-	-	-	-	-	9	13	4
Woburn-mews, West	-	pipe sewer -	-	-	-	-	-	100	-	-	20	1	7
Great James-street -	-	2 new gullies	-	-	-	-	-	-	-	-	5	15	4
Harmood-street -	-	brick sewer, &c.	-	-	314	-	-	-	-	-	179	2	4
Gloucester-crescent -	-	1 air shaft -	-	-	-	-	-	-	-	-	16	19	10
St. Paul's-road -	-	1 new gully	-	-	-	-	-	-	-	-	4	4	4
Camden-square -	-	3 - ditto -	-	-	-	-	-	-	-	-	11	11	—
Ingestre-road -	-	1 - ditto -	-	-	-	-	-	-	-	-	3	15	8
Cross-street -	-	2 - ditto -	-	-	-	-	-	-	-	-	4	10	—

(continued)

Enclosure No. 2, with No. 11—*continued*.

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
HOLBORN—*continued*	King's-road	1 new gully	-	-	2 4 -				
	Wandford-place	1 - ditto	-	-	3 2 3				
	Keppel-street Chapel	improvement works	-	-	22 12 1				
	18, Took's Court	- - ditto	-	-	17 5 11				
	22 to 25, Pratt-street	- - ditto	-	-	38 9 6				
	Boswell-court	- - ditto	-	-	11 15 -				
	Southampton-mews	1 new gully	-	-	9 1 8				
	Harrison-street	2 new gullies	-	-	7 5 1				
	Tom's-buildings	pipe, sewer and gullies	-	457	90 10 1				
	Queen's-road	4 new gullies	-	-	15 16 2				
	Kentish-town-road	2 - ditto	-	-	10 4 8				
	Little Queen-street	1 air shaft	-	-	2 1 2				
	Maldon-road	1 new gully	-	-	5 15 4				
	Kentish-town-road	pipe sewer	-	80	23 9 10				
	Oak-village	brick sewer	248	-	159 3 1				
	Hampstead-road	pipe sewer	-	70	12 3 4				
	Hampstead-road	brick sewer	163	-	105 2 5				
	Willis-road & Angler's-lane	brick and pipe sewer, &c.	1,747	469	1,198 9 9				
	Kentish-town	- - - ditto	714	416	674 10 9				
	Kentish-town	brick sewer and air-shaft	263	-	215 14 2			143 - 1	653 18 10
	Various localities	private drains, &c.	-	-	208 7 1	507 19 9	1,129 7 6	653 18 10	5,780 18 7
			4,166	2,553	4,000 11 3				£. 6,434 17 5
FINSBURY	Sermon-lane	pipe sewer	-	108	23 4 7				
	Hemsworth-street	4 new gullies	-	-	14 16 8				
	Freeling-street	1 side entrance, &c.	-	-	3 12 8				
	William-street, North	1 - ditto	-	-	3 12 9				
	Bemmerton-street	2 air shafts	-	-	- 15 6				
	Lyon-street	1 - ditto	-	-	- 7 9				
	Storey-street	1 - ditto	-	-	- 7 9				
	Edith-street	2 new gullies	-	-	8 - -				
	Herbert-street	3 - ditto	-	-	12 - -				
	Little Cambridge-street	1 new gully	-	-	7 6 6				

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Enclosure No. 2, with No. 11—*continued*.

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
SPITALFIELDS	Wellclose-square	1 air shaft	-	-	1 4 6				
	Cannon-street Road	1 - ditto	-	-	1 12 10				
	Bull-lane, Stepney	1 - ditto	-	-	– 19 3				
	Paternoster-row	pipe sewer	-	170	18 19 7				
	Eele-place	- ditto	-	234	23 17 7				
	Turville-street	2 new gullies	-	-	5 3 7				
	Old Ford-road	1 - ditto	-	-	2 7 2				
	High-street, Shadwell	1 air shaft	-	-	1 3 11				
	Wentworth-street	1 - ditto	-	-	1 17 –				
	York-street	1 new gully	-	-	2 – 5				
	New-road	1 - ditto	-	-	3 10 3				
	Limekiln-hill	1 side entrance, &c.	-	-	20 19 4				
	Wellington-street	1 air shaft	-	-	2 18 3				
	Shadwell-dock Stairs	1 side entrance, &c.	-	-	26 1 –				
	Ocean-street	2 new gullies	-	-	3 14 –				
	Mortimore-road	1 side entrance	-	-	14 18 5				
	Brown's-lane	3 new gullies	-	-	14 13 5				
	John's-street	3 - ditto	-	-	9 2 9				
	East-street	4 - ditto	-	-	21 13 11				
	Richardson-street	2 - ditto	-	-	4 18 10				
	Lady Lake's Grove	1 new gully	-	-	1 10 6				
	James-street	1 - ditto	-	-	2 8 1				
	Hereford-street	2 - ditto	-	-	9 17 –				
	Old Ford Road	1 - ditto	-	-	2 12 2				
	Green-street	1 - ditto	-	-	1 18 8				
	Charrington-park	3 side entrances, &c.	-	-	9 11 8				
	Silver-street	2 new gullies	-	-	4 13 11				
	Nightingale-lane	1 side entrance	-	-	13 2 8				
	London-terrace	1 new gully	-	-	17 9 3				
	Sandys-row	1 air shaft	-	-	2 8 7				
	Emma-street	brick and pipe sewers, &c.	210	398	136 8 3				
	Lamb-street	2 new gullies	-	-	4 10 –				
	Sandys-row	1 air shaft	-	-	1 3 6				
	Nightingale-lane	1 side entrance	-	-	39 3 8				
	Commercial-road	1 air shaft	-	-	12 9 1				

	Mansell-street	1 air shaft	-	-	6 6 –			
	Friendly-place	pipe sewer	-	360	35 19 4			
	Sidney-street	2 new gullies	-	-	5 11 11			
	Mile End Road	1 air shaft	-	-	1 9 8			
	Wheeler-street	1 new gully	-	-	9 16 –			
	Gates-street	1 - ditto	-	-	4 16 7			
	Mile End Road	1 - ditto	-	-	1 15 3			
	Cannon-street-road	1 side entrance	-	-	34 8 5			
	Back of Saville-road	pipe sewer	-	320	49 10 6			
	Whitechapel-road	1 new gully	-	-	7 3 1			
	Great Prescott-street	4 air shafts	-	-	6 9 4 1 6 6			
	White Lion-street	3 new gullies	-	-	9 5 11			
	Great Pearl-street	2 - ditto	-	-	5 2 3			
	Great Prescott-street	1 air shaft	-	-	7 6 3			
	North-street	1 new gully	-	-	4 15 4			
	Manchester-street	1 - ditto	-	-	3 2 2			
	Whitechapel-road	1 - ditto	-	-	5 – –			
	Cannon-street-road	1 air shaft	-	-	1 15 2			
	Union-street	1 new gully	-	-	3 18 7			
	Vincent-street	4 air shafts	-	-	10 19 9 2 9 4			
	John-street, Poplar	1 new gully	-	-	2 19 7			
	Glasshouse-street	pipe sewer	-	326	49 10 8			
	Goulston-street	tanks and water mains, &c.	-	-	182 1 5			
	Various localities	private drains, &c.	-	-	151 10 3			
	Slink-house Bridge	brick sewer	-	123	74 – –			
			333	1,808	1,119 12 3	838 13 3	1,828 15 5	575 1 8	4,362 2 7
HACKNEY BROOK	Park-place	pipe sewer	-	150	18 5 6			
	Shrubland-grove	1 side entrance, and 3 air shafts.	-	-	4 2 1			
	Newington-causeway	pipe sewer	-	21	3 6 4			
	Church-road	2 new gullies	-	-	5 6 5			
	St. Thomas Hospital Estate	16 new gullies	-	-	67 6 6			
	High-street, Homerton	brick and pipe sewer, &c.	1,050	94	529 17 10			
	Various localities	private drains, &c.	-	-	23 2 1			
			1,050	265	651 6 9	420 14 9	2,796 19 2	100 12 2	3,969 12 10
LOWER WAPPING	Wapping-wall	1 side entrance	-	-	6 16 3			
	Anchor and Hope Alley	1 - ditto	-	-	16 4 6			
	Various localities	private drains, &c.	-	-	6 9 –			
			—	—	29 9 9	38 10 11	62 3 1	17 10 4	147 14 1

Enclosure No. 2, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
LIMEHOUSE	Fore-street, Limehouse	1 side entrance	-	-	13 11 9				
	Various localities	private drains, &c.	-	-	2 16 -	5 1 2	9 1 9	9 8 8	39 19 4
UPPER LIMEHOUSE	Various localities	repairs, &c.	-	-	- - -	21 17 4	4 4 8	5 18 3	32 - 3
TOWER HILL	Various localities	private drains, &c.	-	-	3 12 -	1 1 -	- 4 8	12 15 6	17 13 2
HERMITAGE-STREET	Various localities	private drains, &c.	-	-	1 - -	25 19 11	22 4 3	9 14 9	58 18 11
ST. KATHARINE'S	Supervision, &c. of works	- - - - -	-	-	- - -	- - -	- - -	6 13 8	6 13 8
POPLAR AND BLACKWALL.	Poplar	3 new gullies	-	-	6 19 9				
	Manchester-road	side entrance and air shaft	-	-	4 2 3				
	Rope-ground, Millwall	brick sewer	53	-	23 7 9				
	Wade-street, Poplar	1 new gully	-	-	2 12 2				
	East India Road	1 - ditto	-	-	7 - 10				
	Wade-street, Poplar	1 - ditto	-	-	3 9 3				
	Various localities	private drains, &c.	-	-	6 3 -	88 16 9	308 - -	98 - 6	548 12 3
			53	—					

SURREY AND KENT -	Sussex-road - - -	pipe sewer - - - - -	128	9	14	11
	Staple-street - - -	2 new gullies - - - - -	- -	4	2	11
	Francis-street - -	2 - ditto - - - - -	- -	3	14	11
	Duke-street - - -	1 - ditto - - - - -	- -	2	15	2
	High-street, Newington -	1 - ditto - - - - -	- -	2	2	10
	Mermaid-court - -	1 - ditto - - - - -	- -	3	1	5
	Lansdown-place - -	pipe sewer - - - - -	246	19	8	10
	Brewer's-turning, Vineyard.	- ditto - - - - -	88	9	7	8
	Ewer-street - - -	- ditto - - - - -	157	18	8	7
	Mansion-house-street -	pipe sewer and gully - - -	120	14	5	6
	Salisbury-row - -	1 new gully - - - - -	- -	3	6	7
	New Cross-road - -	2 - ditto - - - - -	- -	8	18	6
	Deptford Lower-road -	1 - ditto - - - - -	- -	4	13	5
	Blue Anchor-road - -	3 - ditto - - - - -	- -	16	14	5
	Chester-street - -	pipe sewer - - - - -	125	14	5	3
	Guildford-street - -	- ditto - - - - -	190	17	12	9
	Mill-street - - -	1 new gully - - - - -	- -	3	7	3
	Camberwell New-road -	1 air shaft - - - - -	- -	9	9	–
	Joiners-street - - -	3 new gullies - - - - -	- -	9	19	7
	Old Kent-road - -	1 - ditto - - - - -	- -	4	12	7
	Gainsford-street - -	pipe sewer - - - - -	815	137	14	2
	Church-street, Lambeth -	- ditto - - - - -	63	13	5	2
	Adams' Timber yard -	- ditto - - - - -	813	106	4	1
	Harrow-road-street, Borough.	- ditto - - - - -	138	14	1	3
	Little Queen-street - -	- ditto - - - - -	106	9	5	4
	Shepherd's-lane, Brixton -	- ditto - - - - -	1,284	217	5	1
	Springfield-terrace - -	improvement work - - - -	- -	18	8	10
	Crosier-street - - -	pipe sewer - - - - -	130	18	6	8
	Rockingham-court - -	- ditto - - - - -	74	9	5	–
	Willow-walk - - -	- ditto - - - - -	80	7	4	2
	Red Cross-street - -	- ditto - - - - -	42	4	19	10
	Pleasant-place - -	- ditto - - - - -	646	75	10	–
	Church-street - - -	1 new gully - - - - -	- -	5	11	7
	Portland-place - -	1 - ditto - - - - -	- -	5	1	8
	Union-street - - -	1 - ditto - - - - -	- -	2	13	–
	Earl-street - - -	1 - ditto - - - - -	- -	3	2	–
	Dockhead - - -	pipe sewer - - - - -	529	75	5	2
	Victoria-road - - -	- ditto - - - - -	185	30	9	6
	Tooley-street - - -	4 new gullies - - - - -	- -	14	19	10
	Little Suffolk-street -	2 - ditto - - - - -	- -	7	7	6
	Sun-street - - -	1 - ditto - - - - -	- -	3	10	8
	South Lambeth, by Toll -	1 - ditto - - - - -	- -	3	–	7
	Swan-street - - -	pipe sewer - - - - -	404	39	10	4
	Webber-street - - -	1 new gully - - - - -	- -	2	17	–
	Gravel-lane - - -	1 - ditto - - - - -	- -	4	4	1
	Edward-street - -	pipe sewer - - - - -	51	7	14	–
	Three Crown-square -	- ditto - - - - -	100	14	8	9

(*continued*)

Enclosure No. 2, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
SURREY and KENT— *continued.*	Fair-street	pipe sewer	-	416	36 5 6				
	Hickman's Folly	ditto	-	90	10 8 8				
	Brixton-road	6 new gullies	-	-	32 9 11				
	Wickham-street	pipe sewer	-	94	8 4 11				
	St. George's Circus	new gully	-	-	2 12 8				
	Camberwell-road	ditto	-	-	3 7 9				
	Stockwell-crescent	pipe sewer	-	240	19 - 11				
	By Vitriol Factory, Battersea.	new gully	-	-	3 4 3				
	Cornbury-street	pipe sewer	-	140	12 2 -				
	Westminster-road	side entrance	-	-	35 10 8				
	Three Crown-square	pipe sewer	-	10	1 7 6				
	White Lion-court	ditto	-	104	11 2 1				
	Vine-street	ditto	-	100	7 7 2				
	High-street, Borough	1 new gully	-	-	4 6 3				
	Victory-place	1 - ditto	-	-	2 18 4				
	Loman-street	pipe sewer	-	100	10 6 5				
	Jacob-street	ditto	-	56	6 16 7				
	Fentiman-street	ditto	-	104	9 1 -				
	North-street	1 new gully	-	-	3 10 2				
	Polygon-buildings	pipe sewer	-	80	7 2 10				
	Carlisle-street	ditto	-	218	19 13 4				
	Waterloo-road	2 new gullies	-	-	7 10 -				
	St. George's Circus	1 - ditto	-	-	2 16 11				
	Keppel-street	pipe sewer	-	52	5 5 1				
	Bolton-street	1 new gully	-	-	3 13 6				
	Little James-street	pipe sewer	-	80	20 1 1				
	Opposite 12, Chepstow-place	1 new gully	-	-	3 6 8				
	Lower Deptford-road	2 - ditto	-	-	10 4 1				
	John-street	pipe sewer	-	396	52 6 2				
	Wandsworth-road	brick sewer	120	-	25 6 8				
	Kennington-green	ditto	160	-	40 3 2				
	Marshall-street	pipe sewer	-	102	11 3 2				
	Blue Anchor-road	5 new gullies	-	-	40 14 4				
	High-street, Peckham	1 - ditto	-	-	6 11 11				

Lower Deptford-road	1 - ditto	-	-	-	-	4	18	8		
Wellington-place	pipe sewer	-	-	-	96	5	17	11		
Winchester-place	brick sewer	-	164	-	-	25	8	4		
New Cross	enlargement of pipe sewer		-	-	-	6	19	4		
Sutherland-crescent	pipe sewer	-	-	-	80	6	17	8		
George-street	2 new gullies	-	-	-	-	5	7	9		
Christ Church-street	3 - ditto	-	-	-	-	12	10	3		
Doddington-grove	2 - ditto	-	-	-	-	8	19	4		
George-row	1 - ditto	-	-	-	-	6	5	10		
Jacob's Island	1 - ditto	-	-	-	-	7	13	1		
Wickham-street	pipe sewer	-	-	-	100	8	13	9		
Jacob-street	- ditto	-	-	-	86	8	9	1		
Loughborough Park-road	- ditto	-	-	-	124	11	14	–		
Lorrimore-road	- ditto	-	-	-	146	12	5	1		
Marble-court, Dockhead	1 new gully	-	-	-	-	5	–	–		
Little London-street	1 - ditto	-	-	-	-	4	10	2		
Swan Mead	brick sewer	-	186	-	-	37	5	11		
Tooley-street	arching over sewer		44	-	-	13	14	3		
Albany-road	pipe sewer	-	-	-	1,708	188	3	5		
Jacob's Island	2 new gullies	-	-	-	-	24	9	5		
Harper-street	brick and pipe sewer		51		3,597	461	–	5		
Pitt-street	pipe sewer	-	-	-	1,720	209	9	10		
Hyde-lane	new gully	-	-	-	-	3	16	6		
Shad Thames	pipe sewer	-	-	-	54	6	4	1		
Ashmole-place	1 new gully	-	-	-	-	3	16	7		
Riley-street	2 - ditto	-	-	-	-	7	16	2		
Neckinger-road	1 - ditto	-	-	-	-	3	9	5		
Ship-lane	pipe sewer	-	-	-	98	10	6	9		
Princes-place, Kennington	1 new gully	-	-	-	-	4	–	–		
Acre-lane	1 - ditto	-	-	-	-	4	15	–		
Bird-street, Lambeth	2 - ditto	-	-	-	-	8	1	1		
Ashmole-place	pipe sewer	-	-	-	360	30	6	8		
Short-street	- ditto	-	-	-	146	16	16	9		
Francis-street	- ditto	-	-	-	1,150	133	8	–		
Richmond-street	- ditto	-	-	-	1,450	174	15	6		
New-road, Rotherhithe	new gully	-	-	-	-	4	16	7		
London-street	pipe sewer	-	-	-	1,310	155	11	6		
London-street	4 new gullies	-	-	-	-	13	18	6		
Robert-street	brick and pipe sewer		30		764	101	9	5		
Stockwell	pipe sewer	-	-	-	298	30	3	7		
Belvedere-crescent	- ditto	-	-	-	1,568	168	13	–		
Walworth-common	- ditto	-	-	-	270	30	18	1		
Deptford Broadway	brick sewer, &c.	-	221	-	-	248	13	5		
Thames-street, Rotherhithe	1 new gully	-	-	-	-	5	13	1		
St. Mary's, Bermondsey	pipe sewer	-	-	-	1,751	985	6	–		
Various localities	private drains, &c.	-	-	-	-	1,087	7	–	1,645 6 7	
						4,713	11	10		
						2,012	5	–		
			976		25,772	4,279	11	3		14,194 8 7

Enclosure No. 2, with No. 11—*continued.*

DISTRICT.	SITUATION of WORK.	NATURE of WORK.	LENGTHS of NEW SEWERS BUILT.		AMOUNT PAID FOR				TOTAL.
			Brick.	Pipe.	Constructing New Sewers, Side Entrances, Air Shafts, Gullies, Drains and Inlets.	Repairs to Sewers, Drains, Side Entrances, Air Shafts, Gullies, Cesspits, Outlets, Flaps, Gates, Camp-shedding, Penstocks, &c.	Cleansing by Hand Labour, Casting and Lifting, Cartage, Flushing, Working Gates, and Charges appertaining thereto, &c.	Incidental Works, including Paving, Gravelling, Maintaining Roadways, Compensation, and Supervision of Works, &c.	
			Feet.	*Feet.*	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
GREENWICH	East-street, Greenwich	pipe sewer	-	771	217 16 10				
	East-street, Greenwich	side entrance	-	-	16 6 4				
	Billingsgate Dock	trial shafts, brick sewer	-	-	7 1 5				
	Marsh-lane	2 new gullies	-	-	5 17 9				
	Ravensbourne Sewer	brick sewer	-	-	300 - -				
	Billingsgate-street	brick and pipe sewer	1,234	200	924 15 10				
	Billingsgate-street	side entrance	-	-	77 - -				
	London-street	brick and pipe sewer	712	2,856	876 4 6				
	Croom's Hill, &c.	ditto	1,904	1,534	1,100 - -				
	Various localities	private drains, &c.	-	-	10 1 -				
			3,850	5,360	3,535 3 8	103 12 4	84 13 8	335 11 4	4,059 1 -
WANDLE	Various localities	repairs, cleansing, &c.	-	-	-	1 7 9	63 5 2	42 9 5	107 2 4
FULHAM AND HAMMERSMITH.	Elm-grove	4 new gullies	-	-	4 10 -				
	Garden-row	1 ditto	-	-	1 16 11				
	Vale-place and John's-place.	2 ditto	-	-	7 10 3				
	Elm-grove	pipe sewer	-	608	50 - -				
	Turnham-green	ditto	-	184	27 16 6				
	Webb's-lane	4 new gullies	-	-	4 14 6				
	Turnham-green	12 ditto	-	-	23 9 11				
	Chiswick Garden Estate	2 side entrances	-	-	5 7 -				
	Brunswick House	pipe sewer	-	200	25 - -				
	Various localities	private drains, &c.	-	-	20 3 5				
				992		557 7 6	279 2 1	150 2 3	1,157 - 4

RAVENSBOURNE	Sydenham	pipe sewer	- -	2	13 13 –				
	Lewisham-road	new gully	- -	- -	4 8 4				
	Ravensbourne Sewer	brick sewer	- -	- -	253 16 1				
	Lee-road	- ditto	4,282	- -	3,822 2 5				
	Lee-road	6 air shafts	- -	- -	165 – –				
	Lee-road	18 new gullies	- -	- -	93 7 –				
	Dacre-street	pipe sewer	- -	2,544	427 16 8				
	Various localities	private drains, &c.	- -	- -	31 1 –				
						216 11 3	57 11 3	186 18 5	5,272 5 5
			4,282	2,726	4,811 4 6				
RICHMOND	Hill-street, opposite "Talbot"	side entrance	- -	- -	9 2 4				
	Queen's-road	air shaft	- -	- -	3 11 8				
	Park Shot-road	1 new gully	- -	- -	1 9 10				
	Queen's-road	1 - ditto	- -	- -	3 8 6				
	Marsh Gate-road	1 - ditto	- -	- -	2 3 5				
	By "Black Horse" public-house.	1 - ditto	- -	- -	1 13 8				
	Various localities	private drains	- -	- -	24 6 1				
						24 19 3	119 15 2	56 11 1	247 1 –
MORTLAKE	Supervision	- - - - -	- -	- -	- - -	- - -	- - -	– 8 8	– 8 8
BARNES	Supervision	- - - - -	- -	- -	- - -	- - -	- - -	– 4 4	– 4 4
BOW and BROMLEY	Various localities	private drains	- -	- -	3 12 –	3 4 –	1 13 5	5 14 5	14 3 10

180 M No. 12.

Correspondence, &c.

No. 12.

The Honourable *Henry Fitzroy* to *Richard Jebb*, Esq.

Sir, Whitehall, 21 March 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed copies of a Petition and Report as to the sanitary condition of the parish of St. Mary, Rotherhithe, and I am to request that you will report, for Lord Palmerston's information, as to what measures the Commissioners of Sewers propose to take with reference thereto.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure No. 1, with No. 12.

To the Honourable the Commons of the United Kingdom of Great Britain in Parliament assembled.

The humble PETITION of the Commissioners for Paving, Lighting and Cleansing the Parish of St. Mary, Rotherithe, in the County of Surrey.

Showeth,

THAT the parish of St. Mary, Rotherhithe, contains, by estimation, a population of 17,000 persons, and that there are about 2,900 houses in the said parish.

That the said parish is intersected, in some of the most densely populated districts thereof, by open sewers and ditches, which receive house drainage, night-soil, and accumulations of refuse and filth.

That the length of the streets in the said parish totally unprovided with means of proper house drainage, comprising about 1,500 houses, exceeds six miles.

That the small portion of the said parish that has the advantage of any sewage is of an extremely defective and imperfect nature, with the exception of about one mile of street, through which a sewer was made by the Commissioners of Sewers for Surrey and Kent, in the year 1844.

That from the construction of the sewers now in existence in this parish, they are not adapted to the reception of house sewage, the sediment of which becomes deposited therein, whereby they are in effect merely cesspools; and from the vast accumulation of filth and other injurious matter constantly remaining therein; this system of sewage has been, is, and must necessarily continue to be a great source of disease and death, especially amongst the poorer classes of the inhabitants of this parish.

That your petitioners have represented the above facts to the Commissioners of Sewers, more especially in the month of November 1849, at which time your petitioners presented a memorial to the said Commissioners of Sewers, pointing out the great necessity there was for immediate measures being taken to remedy the evils complained of, and praying that all open ditches and sewers might be covered in, and proper sewers made in those localities which were totally unprovided therewith.

That at the time of forwarding such memorial, your petitioners consulted the medical practitioners of the said parish, who were unanimously of opinion that the cholera and other diseases of a most dangerous nature were increased by the exhalations from the open sewers, and by the extremely imperfect state of drainage throughout this parish.

That the said Commissioners of Sewers, in the said month of November 1849, declined to receive a deputation from your petitioners to confer relative to the grievances complained of and set forth in the said memorial.

That the said memorial was forwarded to the said Commissioners of Sewers, but no notice thereof was taken, nor have any means whatever been adopted by the said Commissioners to remedy or alleviate any of the evils complained of.

That your petitioners have frequently, since the said month of November 1849, urged this subject upon the said Commissioners of Sewers, but without effect.

That your petitioners, in the month of December 1852, forwarded to the said Commissioners of Sewers, a plan and statement, showing that at a comparatively small expense upwards of 650 houses in the said parish (in the most densely populated part thereof) could be effectually relieved by sewage.

That your petitioners have lately received a letter from the Board of Health, containing Dr. Sutherland's Report upon the sanitary condition of this parish, wherein great complaint is made of the want of sewage, and the authorities of the parish are censured in not remedying this evil.

That Dr. Sutherland in his said report states, that this parish requires, more than anything, permanent works directed to its special circumstances, and it will always be unhealthy till it is carried out.

That your petitioners have repeatedly endeavoured to protect the health of the inhabitants of this parish by carrying out the provisions of the "Nuisances Removal and Diseases Prevention Act, 1848," to abate nuisances and matters tending to engender disease, but have been

been unable to effectually enforce the powers of such Act by reason of there being no means of sewage in far the greater portion of the parish.

That the annual amount of sewers-rate collected in this parish since the year 1848 has been upwards of 1,000*l.*

That no improvements or alterations have been made by the said Commissioners of Sewers since the year 1848 to the present time, nor have any steps been taken towards covering up the open, stagnant and foul ditches so vehemently and constantly complained of, although the said Commissioners have received from the rate-payers of this parish upwards of 4,000*l.*

That this parish suffered most severely from the cholera during the year 1849.

That the said Commissioners of Sewers have lately expended very considerable sums of money in forming sewers in other localities, in the Surrey and Kent district, much more healthily situated, and not having so dense a population, and which consequently do not so urgently require sewage.

That your petitioners are of opinion that the present Metropolitan Commission of Sewers is incapable of completely effecting the object for which it was constituted, in consequence of local circumstances attaching to each particular district, but more especially as regards this parish, inasmuch as, from its local and peculiar position and proximity to the Thames, it cannot be included in any one system of general drainage which may be in contemplation for the southern portion of the metropolitan districts.

Your petitioners, therefore, most humbly pray your Honourable House to take into consideration this most important and urgent subject, involving especially the health of the inhabitants of this parish; and that the duties and powers of the existing Commissioners may be modified and altered so far as the same may affect this parish; and that a local board may be appointed by the inhabitants of this parish, who may be enabled to raise the requisite funds, and be enabled to have the management of the sewers in this parish, either subject, as to your Honourable House shall seem meet, to the control of the existing Commission as a central court, or of a surveyor to be appointed by Government, or that your Honourable House will be pleased to grant such further or other measures of relief as to your Honourable House shall seem meet.

And your petitioners shall ever pray, &c.

Enclosure No. 2, with No. 12.

REPORT on the SANITARY CONDITION of the Parish of *St. Mary, Rotherhithe.*

My Lords and Gentlemen,

IN compliance with instructions received from your Honourable Board, I beg respectfully to report, that I yesterday proceeded to Rotherithe to institute inquiries as to a fatal case of Asiatic cholera reported in the district, and as to the condition of the public health with special reference to the threatened approach of the epidemic. I communicated with Dr. Murdoch and Mr. Chandler, from whom I learned that there had been one fatal case of true Asiatic cholera, and two other cases which had recovered.

One of those cases took place in Adam-street, inhabited by a respectable class of people, about a fortnight ago, in a house where two deaths took place during the cholera of 1849, and next door to a house in which other two deaths also took place, and several cases occurred in houses opposite at that time.

There is a great deal of diarrhœa prevalent, which appears to be more intractable than usual in certain districts, but not more so in others.

During the cholera of 1832, Rotherhithe did not suffer to such an extent as some other districts of the metropolis. Its population was then 12,875, and the reported deaths from cholera amounted to 19, or one in 678 of the population.

Its fate was very different during the last epidemic. The population then numbered 17,208, and there died from cholera 352, or one in 49 of the inhabitants, besides 44 deaths from diarrhœa. The epidemic was more fatal in this than in any other of the metropolitan districts.

This high rate of mortality, and the occurrence of isolated cases of Asiatic cholera, and numerous cases of diarrhœa at the present time, renders this district an object of more than ordinary solicitude.

The greater part of the parish lies below high-water mark, and the houses are chiefly situated close to the river, and follow its course, especially at the lower end. In order to reach the river it is needful to ascend from the level of the streets to the banks, and the whole of this portion of the district exhibits marks of absolute want of drainage. The earth around the houses is black, mouldy and wet, and the atmosphere is moist and heavy.

These natural defects of situation are rendered far more injurious than they would otherwise be by the total neglect of all sanitary precautions in the district. It was stated to me, that during the prevalence of the epidemic of 1849, the local authorities were very energetic in removing nuisances and in carrying forward improvements, but that as soon as the disease disappeared all further effort was discontinued, and the district soon fell into its old condition, in which it now exists.

Taken as a whole, Rotherhithe is certainly one of the worst and most neglected districts

Correspondence, &c.

that ever came under my inspection, and it affords a marked contrast to the neighbouring district of Bermondsey, and though thinly peopled in proportion to its area, it contains a large amount of elements of disease among its inhabitants. Nowhere are there to be seen fouler or more offensive or unwholesome ditches; they skirt gardens, surround grass-plats, and pass close to doors and windows of houses, exhibiting their disgusting contents to every eye, and exhaling the elements of pestilence all around them. The people appeared to be in a state of entire helplessness in regard to them; those with whom I conversed were perfectly sensible of the nuisances and danger proceeding from them; some of them complained that they could get nothing done to remedy the evils. One of these ditches runs in front of a row of small houses, in which no fewer than 18 persons perished from cholera during the last epidemic.

This neglect is the more inexcusable, because Rotherhithe has afforded one striking illustration of the beneficial effects of a very simple improvement. There were open tide ditches in the neighbourhood of Swan-lane, into which the contents of privies were allowed to empty themselves; the houses round were very subject to typhus. In three months no fewer than 90 cases of what is called "Black Typhus" took place in these houses; the evil was then remedied, and not a single case has occurred since.

These ditches are not the only nuisances which exist in Rotherhithe; the drainage is defective, and in many places there is none. There is little efficient cleansing, and there are many accumulations of refuse which require removal. Many of the back courts and narrow streets require flagging or paving, and in some parts there is no proper water supply. During the cholera of 1849 bad water was remarked as a powerful predisposing cause of the disease. In one instance in Silver-street 16 houses were supplied by a well of water derived by infiltration from the Thames, and contaminated by infiltration from a foul open ditch; 20 cases of cholera and 13 deaths occurred in these houses, and the well was subsequently covered up; a water-pipe has since been laid in the street, but the people complained that the landlords had only laid the water on to one house.

So far as I could ascertain, the only improvements which have been made since the last cholera have been the covering or filling up of this well in Silver-street, and the improvement of another cholera locality, Ram-alley, by the building of a new church.

In all other respects, so far as I can ascertain from the information of persons on the spot, Rotherhithe is as little prepared against a renewed attack of the cholera as it was in 1849.

The following localities were amongst those most severely affected, and I have extracted from the Registrar-general's Report on Cholera the deaths which occurred in each.

Deaths from Cholera in 1849:

Silver-street	13	On board ships off Rotherhithe	10
Paradise-row and street	13	John's-place	6
Surrey-place	8	Neptune-street	5
Lower Queen-street	8	Elephant-lane	7
Charlotte-row and place	18	Ram-alley	7
Rotherhithe-street	18	Hanover-street	10
Dodd's-place	8	Commercial Dock and ships	8
Adam-street	18	Swan-lane and island	8
Church-street and passage	11	Globe-street	7

In some of these localities a very great mortality occurred in proportion to the population. Thus, Rotherhithe-street, a long narrow tortuous street close to the river, furnished 18 deaths, while Charlotte-row, which contains 28 houses, furnished 16 deaths. This locality is damp, filthy, badly supplied with water, and partially surrounded by a wide open ditch which was filled with thick black putrid fluid, streaming with gas bubbles.

Sic.

I inspected a number of these localities, and have no hesitation in stating, that they are as bad as they were when the cholera ravaged them during the last epidemic.

The following notes appended to the Registrar's returns of deaths from cholera describe with sufficient accuracy the present state of these localities:—

"The house very old, much crowded, being occupied by several poor families in a filthy state." "It would be impossible to keep this house in a healthy state from its extreme dilapidation." "House stands in a narrow alley, badly drained." "House surrounded with several filthy ditches." "An open sewer at the back of this house." "An open sewer at the back." "Several very filthy ditches near this house." "Very filthy open ditch at the back." "House and locality has everything to it unfavourable to health." "Bad water and no drainage." "Drainage very bad, with a large open sewer at the end of the street." "Very damp locality, bad supply of water, and an offensive ditch in the rear."

These statements, which were published in 1849, have led to no sanitary improvements in Rotherhithe.

This district, nevertheless, affords an instance of improvement effected by an intelligent landlord, and which I may place here, by way of contrast, with what has been left undone by the local authorities.

I found a number of cottages from which those enemies of all health and decency, privies with cesspools, have been removed, and their places supplied by water-closets and tubular drainage. The cottages are situated in Rose and Rummer-lane, and are 17 or 18 in number. The new drainage has been in operation for about two years and under, and I felt desirous

of

of ascertaining from the people themselves what result they had experienced. For this purpose, I made a house-to-house inquiry, and the following replies will give a general idea of the result:—

"New drainage in action about two years; no stoppage, no smell; answers very well." "Was in the house before the new drainage was laid down; bad smells and discomfort previously; none now; no stoppage; answers very well." "Pipes put down under two years; a stoppage occurred a month or two after, owing to rags and other things having been thrown down, and from want of habit in using the watercloset, and there being no water laid on; now throws water down regularly, and there has been no stoppage since; formerly lived in a house with a privy and cesspool; smell there very bad; no smell now, and health better." "Had a stoppage in the pan three months ago, easily removed; arose from want of water; throws water down, and the drainage works quite well." "Drainage works well; no smell, no stoppage; lived in the same house when there was a cesspool and privy, which were very foul; no comparison between the two; watercloset as free of smell as the kitchen." "Drainage done eight months; no stoppage; no smells; answers quite well; far more healthy than the privy and cesspool." "Answers perfectly well." "Done for two years; no stoppage; no smell; answers quite well."

I saw the landlord, Mr. Trueman, who stated that the new drainage had answered quite well, and had given him no trouble; and that if he were building new houses, he would introduce it.

I have noted all the stoppages which are said to have occurred. They are hardly worth mentioning, even were they inevitable, when contrasted with the abominable nuisance of open privies and cesspools, which the waterclosets and pipe drainage have supplanted, and the stoppages which ordinarily occur in house drains constructed on the old barbarous principles.

It is, however, important to state, that these stoppages arose entirely from the circumstance which all the people were perfectly well aware of, namely, that the soil pan and tube drain were laid down in every instance without water. The pans have all the usual tubes for admitting the water, but there is none admitted. The people all said they had to keep the drainage free by throwing down water, and that were water laid on, the improvement would be perfect and self-acting.

Here we have an instance in which the combination of works of water supply and drainage, long since recommended by the Commissioners appointed to inquire into the sanitary state of towns, and embodied in the powers of the Public Health Act, has not been carried out, and probably will not be carried out, without new administrative arrangements and legislative authority. The imperfect arrangements in these cottages contrast in a very marked degree with that complete combination of works which I saw a few days ago in operation at Tottenham under the Public Health Act. There are drains for carrying away the water and refuse, and water for keeping the drains clear of deposit, and they act perfectly together. For 2½*d.* per week, little more than half the expense of cleansing cottage cesspools, cottages are supplied with constant water supply, and cleansed immediately from those causes of insalubrity which destroy the health and lower the moral feelings of so large a proportion of the working classes in all towns.

If the imperfect cottage drainage at Rotherhithe had failed in every instance for want of water, it ought not to have excited surprise, or have been any argument against the recommendations of the Sanitary Commissioners, who had expressly discountenanced the plan adopted, but even as it is, with its great imperfection, and the additional trouble it requires to keep it clean, the people strongly and decidedly preferred it to the system it has supplanted.

As regards health, there can be no two opinions on the subject, and it is deeply to be regretted that, with the prospect of another outbreak of epidemic cholera before us, so little advance has been made in combining water supply with impervious tubular drainage as household improvements.

Considering the great mortality which occurred in Rotherhithe during the last epidemic, and the extent of the sanitary evils which require removal, I am of opinion that immediate steps should be taken to prepare for the threatened approach of the epidemic.

The very first matter requiring consideration is the state of the ditches. I am of opinion, that the only means at all likely to effect any good, is draining and filling them up, with or without pipe drains, as the case may require. Part of one of these ditches had been arched over, but a moment's consideration will show this is not enough; means must be taken to prevent the subsoil from becoming saturated with the fœtid contents of those ditches, and if they be only arched over, it must be quite evident that the pestilential exhalations arising from the stagnant sewage in them would enter every house which had the misfortune to be drained into them. The work is one of some magnitude, but the emergency requires it, and it should be done without delay.

I am not aware whether there be legal powers sufficient to enable this improvement to be carried out, but it is my duty to give this warning, and to state as strongly as I can the dangers which will accrue from neglecting it.

A great deal requires to be done also in the way of cleansing and removal of nuisances. Were there no other causes of disease, the filthy state of the worst districts of Rotherhithe would be enough to excite alarm, and to call for active exertions.

A better water supply is also urgently required in these districts.

There are also a great many houses that require inspection and cleansing.

I am not aware what legal powers there may be for adopting the measures required for the

Correspondence, &c.

the public safety, but were it possible, I should strongly advise the local authorities to have some officer, whose duty it should be to attend specially to these precautions. He should visit the houses in the worst districts, especially those of which a list has already been given above.

He should examine into the cleansing of streets, passages and courts, the state of the paving, guttering, sewerage, house and surface drainage, and gully grates, ditches, offensive privies, cesspools, middensteads and other nuisances; the condition of houses in the epidemic localities as regards cleansing, ventilation, &c.; the state of the water supply, as regards its source, quality and amount, and the condition of common lodging-houses. He should certify to the proper authorities all measures of a preventive nature, such as cleansing, removal of nuisances, whitewashing of houses, &c., which may appear necessary.

Continuous cleansing, so as to preserve the air as pure as possible, is absolutely necessary, and no accumulation of putrescent matter should on any account be permitted.

The progress of diarrhœa should also be carefully noted, and reported.

These measures should be actively and perseveringly followed out, so as to prepare the people, as far as possible, for the threatened advance of the disease.

What Rotherhithe requires more than anything else, are permanent works directed to its special local circumstances, and it will be always unhealthy till these are carried out.

I have, &c.

Whitehall, September 1852. (signed) *John Sutherland.*

No. 13.

Richard Jebb, Esq., to the Honourable *Henry Fitzroy*.

Sir, 1, Greek-street, Soho, 1 April 1853.

In compliance with the directions contained in your letter to me of the 21st ultimo, transmitting copies of a petition and report as to the sanitary condition of the parish of St. Mary, Rotherhithe, and desiring me to report, for Lord Palmerston's information, as to what measures the Commissioners of Sewers propose to take with reference thereto; I beg to report, for his Lordship's information, that on the 22d of February last the Commissioners ordered 5,000 feet of brick sewer, 3 feet 9 inches, by 2 feet 6 inches, to be constructed in Rotherhithe-street and Queen-street, Rotherhithe, as shown in the accompanying Sketch, at an estimated cost of 4,000*l.*, and that the working plans and drawings being now nearly completed, it is expected that the work will be put in hand in the course of a few days.

A line of sewer, following the same course, but of a different structure and capacity, was ordered by the Commissioners in the year 1851, but the order for its construction was shortly afterwards countermanded in consequence of the reduction by the Legislature in that year of the rating power of the Commissioners to 3*d.* in the pound, the reduced rate being insufficient to meet the cost of the works then contemplated.

The sewer now about to be constructed will afford considerable relief to one of the worst localities, in respect of drainage, on the south side of the Thames. Of the condition of other parts of the parish of Rotherhithe, in which new works of drainage are much required, the Commissioners are fully aware; but the funds at their disposal will not enable them at present to do more than the work now reported, in addition to the ordinary works of flushing and cleansing open sewers, which absorb annually a considerable proportion of the funds of the district.

I have, &c.

(signed) *Richard Jebb.*

No. 14.

H. Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 6 April 1853.

I have laid before Viscount Palmerston your letter of the 1st instant, reporting that the Commissioners of Sewers have ordered 5,000 feet of brick sewer to be constructed in Rotherhithe-street and Queen-street, Rotherhithe; and I am to request that you will state, for Lord Palmerston's information, what will be the sectional form of this sewer.

I am, &c.

(signed) *H. Waddington.*

No. 15.

No. 15.

Richard Jebb, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 9 April 1853.

In reply to your letter of the 6th instant, I have the honour to state, for Lord Palmerston's information, that the sectional form of the sewer about to be constructed in Rotherhithe-street and Queen-street, Rotherhithe, and mentioned in my letter of the 1st instant, addressed to Mr. Fitzroy, will be the egg-shape, and that its dimensions internally will be 3 feet 9 inches high by 2 feet 6 inches wide at the widest part, as shown in the enclosed Drawing.*

I am, &c.
(signed) *Richard Jebb.*

No. 16.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 2 May 1853.

I am directed by Viscount Palmerston to transmit to you a letter from Mr. John Matson, with its enclosure, on the subject of the drainage of the Camberwell New Road, and to request that you will report thereon for his Lordship's information.

I am, &c.
(signed) *H. Waddington.*

Enclosure No. 1, with No. 16.

1, Surrey Villa, Camberwell New Road,
29 April 1853.

My Lord,

I beg to enclose, for your perusal, a copy Report received from the Commissioners of Sewers upon the subject of the drainage in the Camberwell New Road, which purports to be a reply to a memorial presented by me on behalf of the inhabitants, who are suffering from the want of drainage in that particular locality. Some few months since, my Lord, a deputation from the Camberwell New Road, accompanied by the Members for the borough of Lambeth, waited upon your Lordship, soliciting your kind attention to their peculiar grievances, which were embodied in a memorial presented to your Lordship on that occasion, and your Lordship, after hearing the details, was pleased to express yourself in terms most satisfactory to the deputation, by promising that the works in question should at once be put into execution, without waiting the "grand scheme" which your Lordship stated the Government had in contemplation. The inhabitants, therefore, depute me, my Lord, to convey to you their extreme disappointment from the non-fulfilment of your Lordship's promise by the Commissioners of Sewers, more particularly as the inhabitants of that district have recently been called upon to pay another rate of 6*d.* in the pound, making the fourth rate under the present Commission, and are still left without even so much as a common drain to convey the sulliage from their dwellings. I must not omit to state, my Lord, that one of the deputation who waited upon your Lordship asserted, in your Lordship's presence, that he happened to be one of the surveyors of the highway when the main sewer was commenced in the Camberwell New Road, and that the only obstacle to its completion was the want of requisite funds.

I am, &c.
(signed) *John Matson.*

Enclosure No. 2, with No. 16.

Surrey and Kent.

On the Sewerage of the Eastern Half of the Camberwell New Road.

I beg to report, that that portion of the Camberwell New Road to which Mr. Matson refers, and which is without drainage, is about 3,000 feet in length. There is a brick sewer at each end of this, but neither is deep enough to effectually drain the road. The main sewer in the Surrey and Kent scheme is intended to cross the Camberwell New Road at such a depth as would give a good fall. Until this scheme is partially carried out, it would be (in my opinion) unadvisable to construct a sewer, which would cost nearly 3,000*l.*, into the present inefficient outlet.

11 April 1853. (signed) *Jno. Grant.*

J. Matson,
1, Surrey Villa, Camberwell New Road,
5 April 1853.

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* The Drawing referred to was of a transverse section of a sewer, similar to that given in p. 205 of this Return.

Correspondence, &c.

No. 17.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 5 May 1853.

I HAVE the honour to acknowledge your letter of the 2d instant, transmitting to me, by direction of Viscount Palmerston, a letter from Mr. John Matson, with its enclosure (both herewith returned), on the subject of the drainage of the Camberwell New Road, and requesting me to report thereon for his Lordship's information.

The report of Mr. Grant (engineer of the district under this commission), a copy of which accompanied Mr. Matson's letter, contains the reasons why no efficient measure of drainage for that locality is at present practicable.

In addition to the circumstance that a sewer along the line of road referred to would require to be 3,000 feet in length, and would cost 3,000*l.*, the work would be insufficient and of a temporary nature only, inasmuch as both the existing outlets are too shallow to admit of the construction of a sewer at a sufficient depth to drain the adjacent property; and moreover they now communicate with open sewers into which it is inexpedient to discharge additional house drainage. No effectual remedy can be afforded until the completion of a portion of the main drainage for the Surrey side of the river, to the extent of upwards of 4 miles in length, and at an estimated cost of 49,600*l.*, whilst the available funds of the district have been already appropriated to the execution of other works of urgent necessity.

I have, &c.
(signed) *Richard Jebb.*

No. 18.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M.P.

Metropolitan Sewers Office,
My Lord, 1, Greek-street, Soho, 5 July 1853.

BY desire of my colleagues, I beg respectfully to ask your Lordship to favour the Commissioners with an interview upon the subject of the renewal of the Act under which the Commission is constituted.

I have, &c.
(signed) *Richard Jebb.*

No. 19.

R. W. Grey, Esq., to *Richard Jebb*, Esq.

Dear Sir, Whitehall, 6 July 1853.

LORD PALMERSTON will be happy to see the Commissioners to-morrow at the Home Office, at 3 o'clock.

Yours, &c.
(signed) *R. W. Grey.*

No. 20.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M. P.

My Lord, 1, Greek-street, Soho, 12 July 1853.

IN pursuance of the directions given by your Lordship to the Metropolitan Commissioners of Sewers, at the interview with which you favoured them on Thursday last, I have the honour to submit a list, with a map, showing the intended course of a number of sewers on both sides of the Thames, which it is the decided opinion of the Commissioners are imperatively required to be constructed forthwith.

The estimate for the sewers proposed on the north of the Thames amounts to - - - - - - - - - - - -	£. 324,840
And for those on the south to - - - - - -	243,000
Total - - -	567,840

The

The only addition to the above which the Commissioners would at present suggest, is a sum of about 7,000*l.* for the more complete drainage of Richmond and its vicinity, where an expenditure to about that amount is now urgently required; but the Commissioners wish to bestow a little more consideration upon the plan at present before them for the drainage of that locality before making a definite suggestion upon the subject.

It may be proper to observe that all the works now submitted have been designed with a view to and so as to fall in with the scheme for relieving the Thames from the sewage of London; and two of the main lines now proposed, whilst affording means of immediate drainage to the districts through which they pass, will form an integral part of that scheme whenever it shall be carried out. The lines in question are—(1.) the line of the Hackney Brook between the points marked A and B, extending from near Hampstead to the River Lea near Blackwall; and, (2.) the line between C and D from Kennington Common near Vauxhall Bridge to Deptford Creek near Greenwich.

The list now presented, however large it may appear, is only a selection from a much more considerable list of works, all very much needed, and frequently and urgently pressed upon the consideration of the Commissioners, who in making this selection have rigorously confined their suggestions within the narrowest limit which their sense of duty to the ratepayers permits them to adopt. And they are desirous of most respectfully but earnestly representing to your Lordship, that unless invested with the power of immediately commencing at the very least the works enumerated, they will be placed in a most unpleasant position, and the difficulty of conducting the business of the Commission will be much increased.

As it is impossible that all or any considerable proportion of the works now suggested can be provided for out of income, it is indispensable that recourse should be had to loan, and the lowest amount required to be borrowed for the purpose is 400,000*l.*, making, together with the present charge of 100,000*l.* on the rates, a total of 500,000*l.*, the latter being the limit which the Commissioners suggested to your Lordship at their interview. I beg to transmit herewith clauses which the Commissioners consider are adapted in substance for effecting the object in question.*

From the nature of the works recommended in the several districts, it is in the highest degree important that they should be contracted for at the same time, and, should Parliament grant the necessary means, the Commissioners during the ensuing 12 months will be enabled to commence and prosecute vigorously the execution of the proposed works, a course which will obviate many of the most pressing evils from which the public are now suffering, and of which they have so urgently complained.

I have, &c.

(signed) *Richard Jebb.*

No. 21.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 21 July 1853.

I am directed by Viscount Palmerston to transmit to you the enclosed memorial which has been addressed to him by the inhabitants of West Hackney, Stoke Newington and Stamford Hill, on the subject of the drainage of that district; and I am to request that you will report upon the statements contained in the memorial for Lord Palmerston's information.

I am, &c.

(signed) *H. Waddington.*

Enclosure

* These clauses, modified as to amount, were subsequently inserted in the 16 & 17 Vict. c. 125.

Correspondence, &c.

Enclosure with No. 21.

To the Right Honourable Viscount *Palmerston.*, G.C.B., M.P., &c. &c., Her Majesty's Principal Secretary of State for the Home Department.

The humble Memorial of the undersigned Inhabitants of West Hackney, Stoke Newington and Stamford Hill;

Sheweth,

That the district inhabited by your memorialists, comprising the principal portions of West Hackney, Stoke Newington, Stamford Hill and Shacklewell, extending over an area of 1,100 acres, containing a population of 23,000 at the last census, and rated to the poor at 110,000*l.*, has for a lengthened period contributed to the sewers rates.

That such portion of the above district as is situated within the Hackney Brook Level has paid a sewers rate for 80 years, and that the rates thus levied have, on some occasions, amounted to 18*d.* in the pound on the amount rated to the poor.

That, notwithstanding the heavy amount thus contributed, your memorialists have no sewers within their district, and neither do at the present time, nor ever have, derived any benefit from the operations of the Commissioners of Sewers, but, on the contrary, have been seriously injured by the conversion of a natural watercourse, yet retaining the name of the Hackney Brook, into an open sewer for the benefit of another district, that of Holloway.

That your memorialists have no other means of drainage from their houses than into cesspools, which exist in such numbers that some houses have half a dozen or more belonging to each, and the whole substratum of the district has become impregnated with the elements of contagion and disease.

That your memorialists, being thus circumstanced, humbly submit that it is both unjust and illegal that they should be included under and rated equally with districts (namely, the remainder of the Hackney Brook and Finsbury Level) which do possess a more or less perfect system of covered sewers, in the construction of which the contributions of your memorialists have been expended.

That its being unjust was recognized by the Select Committee of the House of Commons on the Sewers in 1834, who in their report state, "The principle on which the sewers rates are levied is this, that all houses are liable to them, which either receive a benefit from the sewers or avoid a damage; and as directly or indirectly all are benefited by the surface drainage of the streets, all are liable to the sewers rate. This was a fair principle as long as the surface drainage of the town was alone contemplated; but with the increase of civilization, the sewers have become applicable to many other purposes, conducive to the health and convenience of the public in addition to the surface drainage, and it appears to the Committee unjust that the same rate should be levied upon houses enjoying the advantage of an under-ground communication with the sewers, and upon houses possessing no such advantages, and which never can possess them without great additions to the sewerage as it now exists."

That it is also illegal, in support of which your memorialists humbly submit, that their case is identical with that argued in the Court of King's Bench in Easter Term, 1829, when Lord Chief Justice Tenterden gave the following judgment: "Upon consideration and conference together, we are all of opinion that the law is not as it was contended, in support of the rate; but that it is competent to persons acting under this Commission to do that which formerly was done in this place, and still continues to be done in many other districts, namely, to subdivide their districts, and rate the inhabitants of separate parts separately, so that the inhabitants of each part may contribute to the expense of maintaining those works only by which they derive benefit."

That the clause (the 76th, 11 & 12 Vict., c. 112) by virtue of which the present rates are levied, contains a proviso by which the above principle of rating is confirmed, and in order to facilitate such an equitable division of the districts, the 34th clause of the same Act enacts, that the Commissioners shall from time to time divide or form the area under their jurisdiction into separate sewerage districts, having regard in such division or formation to the nature of the ground, to the main lines of sewers by which such separate districts are or shall be drained, or to the main lines of sewers which it may appear to the Commissioners expedient to form for the drainage of such sewerage districts, and to the equal benefit, as far as may be, of all land and buildings comprised in such districts.

That no such equitable and necessary reformation of the sewerage districts having been made, your memorialists humbly pray that clauses may be inserted into any future Bill which may be introduced into Parliament in relation to the sewers, enacting,

1st. That no rate shall in future be levied until the districts have been redivided according to the benefit they derive; and that the rate so levied shall be exclusively appropriated to the carrying out of the drainage of such districts, excepting their fair proportion to defray the general expenses of the Commission.

2d. That

2d. That by a certain date all open sewers shall be covered in, and that no house or other premises shall be allowed to drain into an open ditch or watercourse.

And your memorialists will ever pray, &c.

T. Davis Lamb, S.C.L.
Rector of West Hackney.
John Symonds,
Churchwarden of West Hackney,
Rectory Cottages, Shacklewell.
Thomas Jackson,
Rector of Stoke Newington.
Thos. Andrew, } Churchwardens.
Geo. A. Buckland, }
Henry Law Sommerford Grove,
Churchwarden of West Hackney.
And 1,305 others.

No. 22.

The Honourable *Henry Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 23 July 1853.

I AM requested by Viscount Palmerston to transmit to you the enclosed copy of a letter from several inhabitants of Lower Rotherhithe, complaining of the defective drainage of that district; and I am to request that you will report upon this statement for Lord Palmerston's information.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 22.

My Lord, Rotherhithe, 20 July 1853.

THE undersigned are inhabitants of that part of Lower Rotherhithe lying between the entrance to the Surrey Canal and that of the Commercial Dock; all that part is most imperfectly provided with drains, sewers, &c., and in one part in particular, from Globe Stairs, following the rivers downwards a distance of nearly half a mile, there is no main sewer of any description; the sewage therefore from the houses in this locality is either festering in cesspools or sluggishly finding its way into an open ditch which passes close to the back of Silver-street and near Lower Queen-street. In these streets in 1849 the cholera cases were more numerous and more fatal than in any other locality in or around London.

The undersigned have their places of business, and several of them their dwelling-houses, in this very locality, and employ a number of men, who, with their families, live in this neighbourhood likewise. The undersigned have always paid with regularity their rates, and they cannot conceive that a greater injustice can be perpetrated on them, their families and work-people, than systematically leaving this district in the same deplorable condition, in a sanitary point of view, as before the outbreak of cholera in 1849. The subscribers are not fully aware whether they are quite right in addressing your Lordship on this, to them, important subject, but they are anxious for immediate redress, and therefore appeal to your Lordship, knowing that if the matter falls within your Lordship's department, a remedy will be quickly applied, and hoping, if it does not, that your Lordship's known sympathy for the welfare and the comfort of the people generally, will induce you to give us such information as will enable us to apply to the proper parties for the redress of this matter.

We remain, &c.
(Here follow the Signatures).

Right Honourable Lord Palmerston,
Secretary of State for the Home Department.

No. 23.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*.

My Lord, 1, Greek-street, Soho, 26 July 1853.

I HAVE the honour to return to your Lordship, (1.) my letter to you of the 12th instant, and, (2.) the list which accompanied it of sewers proposed to be executed with the aid of the loan of 400,000*l.* mentioned in the letter, both of which documents your Lordship placed in my hands yesterday in order to expedite a Return moved for yesterday evening in the House of Commons by Sir Benjamin

Correspondence, &c.

Hall. That Return was made last night; and in order to do this, I was under the necessity of including in the Return the map originally accompanying my letter, in lieu of which I now beg to enclose another copy of the same map.

I have, &c.
(signed) *Richard Jebb.*

No. 24.

Richard Jebb, Esq., to the Honourable *Henry Fitzroy.*

Sir, 1, Greek-street, Soho, 27 July 1853.

I HAVE to acknowledge the receipt of your letter of the 23d instant, addressed to the Metropolitan Commissioners of Sewers, transmitting a copy of a letter from several inhabitants of Rotherhithe, complaining of the defective drainage of that district, and requesting the Commissioners to report upon the statement therein contained for Lord Palmerston's information. And I have the honour, on the part of the Commissioners, to report that the Commissioners, though aware of the defective drainage of the locality in question, have from various causes been unable sooner to apply an effectual remedy, but that at the Court of Sewers to be held on Tuesday next, the 2d of August, tenders will be opened for the execution of drainage works calculated to afford relief to the district; after which the utmost despatch will be used in putting in hand and completing those works.

I am, &c.
(signed) *Richard Jebb.*

No. 25.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 28 July 1853.

IN reply to your letter of the 21st instant, addressed to the Metropolitan Commissioners of Sewers, transmitting a memorial to Lord Palmerston from certain inhabitants of West Hackney, Stoke Newington and Stamford Hill (herewith returned), and requesting the Commissioners to report upon the statements contained in the memorial, I have the honour, on the part of the Commissioners, to report as follows for his Lordship's information.

The memorialists are inhabitants of adjacent parts of two contiguous but perfectly distinct sewerage districts, called respectively the Finsbury Division and the Hackney Brook Level, represented in the accompanying tracing, the former by a blue, and the latter by a yellow tint, the darker portions in each indicating, as nearly as can be ascertained, the parts inhabited by the memorialists.

The statements in the memorial appear to apply principally, if not entirely, to the Hackney Brook Level, to which level accordingly I shall confine my observations.

Prior to the consolidation of the separate Commissions by the Act of 1848, the Hackney Brook Level, and five other levels (included collectively in what was known as "the Tower Hamlets Commission"), were under the superintendence of a separate body of Commissioners, who during the 10 years preceding the consolidation made five rates on the Hackney Brook Level; viz.:

	s.	*d.*	
30 June 1840	1	6	in the pound.
7 September 1841	1	–	„
11 April 1843	1	–	„
7 January 1845	–	6	„
16 October 1846	–	9	„

Since the consolidation of the Commissions in 1848–49, the Metropolitan Commissioners of Sewers have made two rates upon the same level; viz.:

	s.	*d.*	
11 October 1850	–	6	in the pound.
27 October 1852	–	6	„

The

The Hackney Brook Level never has been mixed up, as alleged in the memorial, with the Finsbury Division, either in its rating or in its expenditure; and for the last quarter of a century it has uniformly been rated by itself, and its rates expended exclusively for its own benefit. In 1828, indeed, the Tower Hamlets Commissioners attempted to combine the whole of the six levels under their jurisdiction by including them in one common rate. This act was resisted by the inhabitants of the Hackney Brook Level, who removed the proceedings into the King's Bench by certiorari. That court decided that it was not lawful for the Commissioners so to combine the several levels under their jurisdiction, but that each must be treated separately. The case (Rex *v.* The Commissioners of Sewers for the Tower Hamlets) is reported in vol. 9 of Barnewall and Cresswell's Reports, p. 517, and it is referred to in p. 4 of the memorial, but the memorialists appear to misapprehend the true import of the decision, as though it enjoined a subdivision of each level into still more minute portions for the purpose of separate rating; whereas an attentive perusal of the case will show that nothing more was insisted upon by the court than the obligation of the Commissioners to observe the ancient division of the entire Tower Hamlets district into the six levels of which it consisted.

Independently of that case, the memorialists urge the expediency of a readjustment of the present rated districts, under the powers conferred upon the Commissioners by the 11th & 12th Vict. c. 112. It will be unnecessary to say anything upon this large question further than it may concern the particular locality under consideration. To the Commissioners the memorialists, or those who represented them, have been somewhat more explicit and definite in expressing their views than they have been to Lord Palmerston; for, in a late communication with this Commission, they requested the Commissioners to separate the parish of West Hackney from the rest of the entire Hackney Brook Level, and to make it a distinct district for all purposes of rating and expenditure, urging as a principal reason the sufficiency (as they alleged) of the sewers rates collected in the parish to meet its requirements, including a main line of sewer along the Stoke Newington Road (marked D C in the tracing), the immediate construction of which they at the same time suggested. The cost of that sewer would be about 6,000 *l.*, of which half would be payable by the Finsbury and half by the Hackney Brook Level, the course of the sewer following the boundary line of the two districts.

The answer to this demand of the memorialists is, that whilst a sixpenny rate on the entire Hackney Brook Level produces about 3,500 *l.*, the proportion of that rate produced in West Hackney amounts to only 400 *l.*, an amount far from sufficient, even supposing the whole of it applicable to that single purpose, for defraying half the cost of constructing the sewer asked for; and that, until the Commissioners are enabled to borrow money on the security of the rates, it would be far more economical, and much better in the end, to apply the available income of the whole level in executing useful and permanent works successively in different portions, than to fritter it away in fragments simultaneously in each portion of the level. This was fully explained to a deputation from West Hackney, who had an interview with me on the 14th May; and the decision of the Commissioners upon the subject was afterwards communicated to the parties concerned by a letter from the secretary, dated 17th June last, addressed to the Rev. T. Davis Lamb, rector of the parish, of which I enclose a copy.

I have to add, that the large and filthy open stream, called the Hackney Brook, mentioned in the memorial, and serving as the main trunk channel for the drainage of the Hackney Brook and Finsbury districts, requires to be straightened, deepened, and covered in, an operation which will be very costly. The red line A C B on the tracing shows its intended course. The proportion of the expense payable by the Hackney Brook Level, together with the cost of the other sewers in the same level proposed to be executed immediately, should Parliament pass the borrowing clauses now before the House of Commons, will amount, on a rough estimate, to 53,775 *l.*; but that sum does not by any means represent all that is required in the same district.

I am, &c.
(signed) *Richard Jebb*, Chairman.

Correspondence, &c.

Enclosure with No. 25.

Sir, 17 June 1853.

I AM directed by the Metropolitan Commissioners of Sewers to inform you, with reference to the matters adverted to by the deputation from West Hackney, who attended at this office on the 14th May last, that it appears from the report of the engineer of the district that the locality particularly referred to comprises about one-fourth part of the Hackney Brook Level, and that the main sewer proposed to pass along Stoke Newington Common to Hackney will form an efficient outlet for the locality in question. To construct a sewer along Stoke Newington Road for the houses therein would cost about 6,000 *l.*, and its outfall would necessarily be into the Finsbury division in the absence of the main outfall, and that the rate for the above locality, only at 6 *d.* in the pound, amounts to about 400 *l.* per annum. I am to express the regret of the Commissioners that they cannot accede to the request made to them to erect the parish of West Hackney into a separate sewerage district.

I am, &c.

Rev. T. Davis Lamb, Rectory, West Hackney. (signed) *E. H. Woolrych*, Secretary.

No. 26.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 1 August 1853.

I AM directed by Viscount Palmerston to refer to you for your consideration the enclosed letter from Mr. Thomas Watts, relative to a plan proposed by him for the drainage of the metropolis, and to request that you will report thereon for Lord Palmerston's information.

I am, &c.

(signed) *H. Waddington.*

Enclosure with No. 26.

Mr. *Thomas Watts* to Viscount *Palmerston.*

2, South-street, Grosvenor-square,

My Lord, 20 July 1853.

HAVING read in "The Times" paper a few days back that Government was about taking into their consideration the best method of draining the metropolis, I have taken the liberty of addressing your Lordship upon the subject, feeling confident that your Lordship would be most anxious that the best method should be adopted for accomplishing so desirable an object as the getting rid of the discharge of the sewers into the Thames, as at present.

About two or three years back the Commissioners of Sewers requested competent persons to furnish plans for the general drainage, and upwards of 100 plans were sent in for their approval, but my plan stood alone for simplicity, durability, and the only method of getting rid of the deposit that must accumulate in so flat a district, and I offered to furnish a working model of this method for their approval.

If your Lordship will have the kindness to read the enclosed plan, you will see that double cast-iron sewers are proposed to be placed on both sides of the river; and I have asked to explain this on two principles; the first, why not one sewer of larger dimensions instead of two smaller; I answer, that a double sewer could be placed at much less expense, as they could run nearly the whole line of distance through the centre of the main streets; but if placed in one, it would involve an enormous outlay by the removal and undermining of property, as to render the works almost impracticable. On the second principle, why not brick sewers built in cement; the answer, that no brick or stone work would withstand the pressure from within; when once choked with water they would burst in all directions, on the same principle as the bursting of a bridge as soon as the water chokes up the arch, which brick sewers would be liable to in heavy thunder storms, and consequently are only fit for external pressure; I therefore beg your Lordship will cause a plan for the general drainage to be laid before the public, in order that the best method should be adopted for the public good. I have been informed that part of the general drainage has been commenced near Westminster Bridge. I cannot understand how such talented gentlemen as the present Commissioners could sanction such a plan, as it is quite contrary to all mechanical rule of carrying out the works, and if persevered in must end in a total failure, and only add to the last 50 years of bad drainage; for after 25 years' practical experience as a builder, I am convinced that whatever permanent plan is adopted, the works must be commenced at the outlet, and the fall of the river strictly adhered to; you will then have an artificial Thames in miniature, and take off the discharge from the present sewers as the works proceed, and add the method of getting rid of the deposit, which is simple and certain in action.

So much time has been lost by the Commissioners about the difficulty of the undertaking; but I assure your Lordship there is no difficulty whatever if the works were commenced at the

the right end, and any apparent difficulty I should be most happy to explain, for I have often surveyed the line of the river as far down as Southend, and find nothing impracticable. I can refer your Lordship to the following persons, who will speak as to my being a person who may be depended upon: his Excellency the Lord Lieutenant of Ireland, Lord Panmure and Admiral Bowles.

I have, &c.
(signed) *Thomas Watts.*

No. 27.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Metropolitan Sewers Office, 1, Greek-street, Soho,
Sir, 3 August 1853.

I BEG to acknowledge the receipt of your letter of the 1st instant, addressed to the Metropolitan Commissioners of Sewers, and enclosing for their consideration a letter from Mr. Thomas Watts (herewith returned) relative to a plan proposed by him for the drainage of the metropolis; and on the part of the Commissioners I have the honour to report thereon for the information of Viscount Palmerston.

In answer to a public invitation issued in the year 1849 by the first body of Commissioners appointed under the statute 11 & 12 Vict. c. 112, upwards of 160 plans, including that of Mr. Watts, for the main drainage of London, were sent in to the Commissioners, who referred them to a Select Committee of their own body, consisting of Sir John Burgoyne, Captain Vetch, Mr. Rendel, Captain Harness, and Mr. Robert Stephenson. The Committee, having carefully examined and considered the whole of the plans, made their report to the Commissioners on 8th March 1850, classifying the several schemes, and noticing individually those which they deemed worthy of special mention; fourteen were thus noticed, amongst which Mr. Watts's plan was not included.

I have, &c.
(signed) *Richard Jebb.*

No. 28.

Horatio Waddington, Esq., to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 5 August 1853.

HAVING laid before Viscount Palmerston your letter of the 3d instant, I am directed by his Lordship to request that you will forward to me for his information a copy of the report referred to in your letter, made by the Select Committee of the Commissioners of Sewers in March 1850, classifying the plans for the drainage of the metropolis.

I am, &c.
(signed) *H. Waddington.*

No. 29.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Metropolitan Sewers Office, 1, Greek-street, Soho,
Sir, 8 August 1853.

IN compliance with Lord Palmerston's direction, conveyed in your letter of the 5th instant, I have the honour to enclose a copy of the report made by the Select Committee of the Commissioners of Sewers in March 1850, classifying the plans for the drainage of the metropolis.

I have, &c.
(signed) *Richard Jebb.*

Correspondence &c.

Enclosure with No. 29.

Metropolitan Commission of Sewers.

Report on the Plans for the Drainage of London.

(Presented to the Court of Sewers, held on the 15th March 1850, and ordered to be printed for the use of the Commissioners.)

We have, pursuant to the Resolution of the General Committee of the 15th December last, carefully examined and considered the whole of the plans and suggestions for the drainage of London submitted to the Metropolitan Commissioners of Sewers, and we now proceed briefly to state, for the information of the General Committee, the principal conclusions at which we have arrived upon the subject referred to us. These plans, it may be remarked, were not sent in upon the invitation of the present Commission; and it is probable that, were we now called upon to deal with the drainage of London as an original question, and wholly without reference to previous proceedings, we might reflect that a well conceived and maturely digested plan of general drainage could not be framed without a larger stock of local information of an accurate and specific character than could be collected by the unaided efforts of individuals, or made accessible to them without undue expense and inconvenience.

The effect of this deficiency of the necessary information has become apparent in several of the schemes submitted to us, which, though well conceived, so far as regards their general features, are wholly inconsistent with the levels and other natural conditions of the localities to which they are intended to apply. We have made every allowance for the disadvantage to which the authors of the schemes were thus subjected; and wherever an error did not lie at the root of the system, but was merely one of detail, we have disregarded it, and endeavoured to give full effect to the suggestion of the author. The plans may be conveniently distributed under the following divisions:—

1. That which may be designated as the Portable Cesspool System, by which it is proposed, that each dwelling-house should be furnished with a portable iron or other vessel or receptacle for fæcal matter, which is to be periodically removed to depôts, situate in the suburbs of the metropolis, whence it is to be distributed in the form of manure for the purposes of agriculture. It is an essential condition of this class of schemes, that as little water as possible should be allowed to mingle with the solid sewage matter, in order that its fertilizing power should not be diminished, and that its augmented bulk should not oppose obstacles to its convenient removal and transport.

2. The schemes included under this division contemplate the discharge of the whole drainage of London into the Thames, and the maintenance of the present system of outlets, though under improved conditions. The projectors contend that the river is the natural and only legitimate outlet for the sewage of the metropolis, and place reliance upon the effect of an increased supply of water, so abundant as to ensure an almost unintermittent current in the sewers, by which it is assumed that the sewage matter will be extensively diluted, and its effect upon the vast body of tidal water rendered scarcely perceptible. It is also a distinguishing feature of these schemes, that the outfalls of the sewers are intended to be carried out to or beyond low-water mark, and generally into the middle of the river.

3. The authors of the projects included in the third division propose to lay down tunnels or culverts of iron, brick or other material, in and along the mud-banks of the Thames, and occasionally in or under its bed, for the purpose of intercepting and receiving at the various outlets of the existing sewers the drainage of the districts on each side of the river. These culverts or tunnels are generally continued to the marsh grounds in the county of Essex, beyond the River Lea, on the north side of the Thames, and to Plumstead Marshes on the south, at which points reservoirs and filtering beds are to be formed for preparing and rendering portable the sewage matter for manure.

4. The fourth division differs from the preceding one in this particular, that, instead of having a single intercepting sewer at the lowest level, it proposes several of such sewers at progressive ranges of altitude, determined by the various drainage areas, with the view of preventing the refuse of the higher portions from descending to and encumbering the flat districts below. In the great majority of these projects these lines of intercepting sewers are conducted to points in the marshes to the east of London, at a lower level than low water, in consequence of which it becomes necessary to employ steam power to pump up the refuse.

5. The fifth division involves the establishment of cesspools at the outlets of the principal sewers along the banks of the Thames, it being the intention of the framers of this class of plans to unite several of these outlets into one, according to the conditions and requirements of particular localities; and at these points of union or concentration to erect pumping apparatus of great power for conveying the sewage matter into the rural districts, either through iron pipes, or by means of carts, barges, or other modes of transport.

6. This class has for its object the division of the metropolis into separate drainage areas, in the centres of which it is proposed to form sumpts, or pits, for the reception of the sewage matter, from which it is intended to be pumped and distributed by various methods, for the most part similar in character to those adopted in the case of the schemes described under the last division.

7. This division includes a numerous class of projects, which, with scarcely an exception, instead of being directed to the object of making provision for an improved system of general sewerage, are almost exclusively confined to the consideration of processes and expedients

expedients for infiltrating, deodorizing, and solidifying the sewage matter for the purposes of the farmer and market gardener.

In addition to schemes involving definite characteristics, and susceptible of some species of classification, numerous communications have come under our notice which may, for the most part, be described as vague speculative disquisitions on collateral and subordinate branches of the general subject of drainage, few of which can be said to possess any practical value. It is observable that the great majority of these schemes adopt, as an essential principle, the diversion from the Thames of the great mass of London sewage matter now discharged into it, an object which it appears to us to be most desirable to accomplish to the greatest practicable extent. We also assent to the views of those who are opposed to the separation of surface and house drainage. We think it objectionable, generally, to bring down the drainage of the high grounds to the lower districts; and we agree in the opinion, that it is of paramount importance to make every effort for accomplishing the drainage of London by natural means; that machinery should not be employed generally, or on a large scale; and that it should only be resorted to in the last instance, and under special circumstances, as in the case of detached and insulated districts limited in extent, and so situated as to render it a matter of undue difficulty to unite them with others.

In expressing the results of our examination of these plans (which is the task entrusted to us), we take the opportunity of remarking, that it is not proposed, in the course of the present observations, to exceed the limits of that task, or anticipate the decision of the Commissioners, as a body, by laying down the system which it may be advisable for the Commission to adopt in discharging one of the main duties confided to it; that is to say, in making provision for the effectual drainage of London.

With this remark we proceed to enumerate those among the plans submitted to us which appear deserving of special mention, and briefly to describe some of their more prominent features, referring, for a fuller account of their scope and objects, to the expositions of them furnished by the authors themselves, to the descriptions which accompany them, the printed statements in the possession of the Commissioners, and to the classification of them appended to this Report.

The best conceived and most practicable scheme submitted to the Commissioners is, in our opinion, that of Mr. J. B. M'Clean; and though we do not deem ourselves justified in recommending any one of these schemes for adoption, as a whole, we yet think that Mr. M'Clean's plan contains many of the main elements of a sound and judicious system of drainage. It is characterized by a well-devised system of intercepting sewers; in determining the situation and course of which a careful and elaborate study of the levels has evidently been made. These intercepting sewers generally follow the direction of the main thoroughfares, and avoid any extensive interference with private property.

The chief of them, on the north of the Thames, commences near Battle Bridge, and, after running a course of nearly eight miles, terminates at the River Thames, at some distance below the River Lea.

There is, however, one portion of the metropolis, namely, the long narrow tract lying on the north margin of the Thames, between Charing Cross and Shadwell, for which sufficient provision does not seem to be made. It is not made apparent whether it is proposed to resort to pumping for the drainage of this part of London; but with regard to a large proportion of the tract in question, no other expedient would seem to be applicable.

The lower districts of Westminster are treated in a somewhat peculiar manner,—namely, by carrying an iron syphon across and underneath the Thames above Vauxhall Bridge. This portion of the scheme involves great difficulties, and we consider it decidedly objectionable; but it must be borne in mind, that it proposes to deal with the drainage of Westminster (confessedly a difficult subject) without the aid of a pumping apparatus, or a deep tunnel, or of a discharge into the Thames, as at present. While pointing out these objections to the scheme, we think it just to direct attention to the comprehensive arrangement of the intercepting drains, and to the judgment displayed in the mode adopted for finally disposing of the sewage of a great proportion of the metropolis by natural means; and though it leaves full scope for any operations designed for the preparation of sewage matter for agricultural purposes that may be proved to be advisable, it does not render the efficiency of the entire scheme dependent upon the success of such operations. Neither can we omit to notice the great labour, care, and skill which have been brought to bear upon the preparation of the plans and sections, by which the exposition of the project is accompanied; the sections evincing a most elaborate study of the existing sewers, and of the means available for blending them with the extended improvements the author proposes. It is an important feature of the plan, that, except in the instance above referred to, the drainage is effected without the use of pumping, and it is not improbable that the main features of it will be found in accordance with the principles which it will be deemed proper eventually to adopt.

Though the praise of having framed a design for the drainage of the metropolis, possessing a certain degree of unity and consistency, and capable, with partial modifications, of being carried out according to its general scope and conception, appears to us due to Mr. M'Clean alone among those who have contributed the plans under our consideration, four other plans have come under our notice, each possessing, according to the particular views and intentions of its author, an amount of merit in individual portions of it, justifying a special notice of them. We allude to the plans of Messrs. Nasmyth and Statham, Mr. J. Bailey Denton, Mr. J. Phillips, and Mr. H. Austin.

The plan of Messrs. Nasmyth and Statham, and the descriptions which accompany it, only have reference to the south side of the Thames; but the authors state they have also

Correspondence, &c.

also directed their attention to the north side of the river, and are prepared to present details of that portion of their plan. Their system on the south side consists of a deep main sewer from the neighbourhood of Battersea Bridge, extending through Kennington, Camberwell, passing under Deptford Creek by means of a cast-iron syphon, and terminating at the Greenwich Marshes. Into this it is proposed that the sewers of Lambeth, Southwark, and Bermondsey should discharge themselves, water entering them from the Thames at or near high-water mark.

This plan is characterized by merit in many of its details, and has evidently received much attention. It is somewhat similar in its general features to the project of Mr. M'Clean and Mr. Bailey Denton, with reference to the same localities. But the objects proposed by the authors are, we think, capable of being effected by less complicated machinery.

Mr. Denton proposes high level intercepting sewers, to terminate at places conveniently situated for reservoirs, and the employment of the sewage matter for agriculture; to convey by two low level drains, one north and the other south of the Thames, the drainage of the lower part of the metropolis to Plumstead Marshes and Barking Creek. He intends to obtain a large supply of water from the Thames, a little above Boulter's Lock, and another from the River Colne. The northern portion of London is supposed to be divided by the Fleet Ditch. The sewage of the portion west of the Fleet Ditch is drained by two intercepting sewers, leading towards the west to beyond Bayswater, where a junction is formed with a large drain running from Brentford to Plumstead Marshes, crossing the Thames by a syphon under its bed, between Vauxhall and Westminster Bridges. The part of the metropolis lying east of the Fleet Ditch is drained by three intercepting sewers, which unite near West Ham, and extend to a large depôt at Barking Creek.

Mr. Denton's observations evince considerable practical discernment and knowledge of the subject; and his project indicates that much attention has been bestowed upon it. In its general outline it bears some resemblance to that of Mr. M'Clean, but in the treatment of the various drainage areas, in the arrangement and direction of the main lines of sewers, and in other particulars, it is, in our judgment, decidedly inferior to it.

The most marked feature in the plan of Mr. John Phillips is a deep tunnel from Twickenham to Plumstead Marshes, at a depth of 78 feet beneath the surface, and passing several times under the Thames. It proposes the separation of natural, or land and surface waters from artificial, that is to say, house and soil drainage. The drainage on each side of the tunnel is effected by a series of branch intercepting sewers, the directions of which have been well considered, and display a thorough knowledge of all the localities they traverse, and the peculiar difficulties to be encountered in each case. It is probable that the system of branching sewers here proposed would be one of the best systems that could be devised for effecting the drainage of London, supposing the Thames to be maintained as an outlet; but the case is wholly altered when this system is viewed in conjunction with a deep tunnel. It is contemplated that the sewage should be pumped from the terminal depôts to an elevated reservoir on Shooter's Hill, from whence it is to be distributed for the purposes of the agriculturist. The expenses of this scheme would, even if it were unobjectionable in other respects (which it is not), render its execution commercially impracticable. But the exclusion of the surface water from the channels for soil drainage, where it might be advantageously employed, the necessity of providing an extensive system of new sewers, the construction of a costly tunnel without adequate objects, and the bringing down the drainage of the high grounds to the lowest level to be pumped up again to a great altitude by means of complicated and expensive machinery, all of which are incident to this scheme, appear to us valid objections to its adoption. But in expressing this opinion it is proper to state, that the plan is distinguished by a thorough knowledge of the localities to be dealt with, and by great merit in the drainage details. It furnishes many valuable hints, and cannot fail to be of use in carrying out the system to be eventually adopted.

The system of Mr. Austin is to concentrate the sewage of given areas at different centres or points at which engine power is to be applied for forcing it in a liquid state into various agricultural districts adjacent to the metropolis. The mode of collecting the sewage on the north side of the Thames is rather by means of intercepting sewers, in conjunction with sumpts; on the south side it is effected by central sumpts and engines: the specific mode of distributing the sewage is not clearly stated, but some allusion is made to that said to be practised by the existing Sewage Manure Company. He contemplates discharging the sewage into the Thames, when there is no demand for sewage manure. The suggested line of intercepting sewers on the north side, terminating at the River Lea, is a judicious one, as is that between the Effra and Ravensbourne. Many of the views propounded by Mr. Austin are correct in the abstract; but the multiplication of these receptacles for sewage matter in the metropolis, the entire dependence upon machinery for the efficiency of the system, and the great mechanical difficulties attending the storing of a vast mass of sewage for several months in the year, or discharging it into the Thames, are, amongst others, serious objections to this project.

Several other schemes evince merit in some portion of their details, and furnish useful hints on incidental branches of the subject. The schemes we allude to are those of—

Mr. Allen,	Mr. Dunn,	Captain Moorsom,
Mr. Bardwell,	Mr. Gibbs,	Mr. Netherway, and
Mr. Doull,	Mr. Moffatt,	Mr. H. Phillips.

We think it right, before concluding our observations, to advert to the subject of expense; and though we have felt justified in expressing commendation of several of the propositions submitted

submitted to us, we are bound to state that, in our opinion, the estimates sent in are, with scarcely an exception, totally inadequate; a circumstance having a most important bearing upon the subject, as, in appreciating any scheme to be eventually decided on, the question of expense is one of the primary elements for consideration. As already remarked, the object of these observations is to present to the minds of the Committee the more prominent characteristics of the plans they are called upon to consider, and not to define the system of drainage which it may hereafter be considered expedient to adopt.

(signed) *J. F. Burgoyne.*
James Vetch.
J. M. Rendel.
H. D. Harness.
Robert Stephenson.

1, Greek-street, Soho, 8th March 1850.

Classification referred to in the foregoing Report.

My Lord and Gentlemen,

We have, in accordance with your directions, examined the several plans for the drainage of the metropolis, and have now the honour to lay our classification of them before you.

We have experienced some difficulty in making such an arrangement as should be at once sufficiently comprehensive and detailed, arising from several of the schemes having specific analogies, although generically distinct, and conversely. After as much deliberation as our time would permit, we have considered the outfall to afford the best basis for classification; and having several times remodelled our arrangement, we find that the whole number may be classed under two heads—the Thames, and the Country.

Our first head we find may be viewed as twofold—viz., whether the discharge into the stream be immediate or mediate; that is to say, whether the whole sewage be thrown at once into the stream, or after it has undergone the process of filtration or subsidence, preparatory to the manufacture of poudrette or other form of solid manure.

The first of these two heads has two subdivisions, accordingly as the discharge be made by means of the present sewers, or by a new channel.

To the second we have allotted three, by the consideration of the relative position of the receptacle in which the separation of the solid from the liquid drainage takes place, whether it be in a reservoir in the marshes below London, in sumpts, or in tanks, in connexion with present sewers.

The number of plans arranging themselves under the first of these appeared to justify a further subdivision; we have therefore considered by what means the sewage was conveyed to the depôt for its preparation, and we found four distinct proposals indicated in the subjoined Summary by the letters *a*, *b*, *c*, *d*.

The paucity of schemes comprised under our second outfall scarcely necessitated a further subdivision; but in order to bring the prominent ideas set forth in the several plans distinctly before your Honourable Board, we have considered whether their surplus was discharged into the sea or into permeable strata, or wholly diffused over the surface of the land.

The subjoined Summary indicates the relative proportion which the various proposals bear numerically to the mass; by which it will be seen that rather more than half are for tunnels carrying the drainage into large depôts in the marshes; about one-fifth for intercepting tanks; one-twelfth propose sumpts, with overflow into the Thames; and as many discharge the drainage into the country, independently of that stream.

We have further thought it advisable, in order to correct any error of judgment we may have committed in our classification, to append a marginal note to such schemes as contained any feature in addition to the heading under which we had classed it. All these without such appendage we believe to be fully described by their respective headings.

We have been in doubt whether to indicate the amount of development of each plan, seeing that they exist in every stage, from the first rough verbal sketch of the projector's thought, up to the complete details of plans, sections, and estimates. Our instructions did not, however, appear to justify such an indication; we have therefore arranged the whole number in one classification, subject, of course, to your further instructions on this subject.

We have, however, kept totally distinct all such miscellaneous suggestions as did not imply any plan for the drainage of the metropolis, but confined themselves to observations upon details of house or street drainage, the use of chemical agents, supply of water, &c., and have subjoined a complete list of them.

We trust your Honourable Board will pardon any error in logical arrangement, in consideration of the complicated nature of our subject, and the short period allowed for its consideration.

We have, &c.
(signed) *J. W. Bazalgette.*
Edward Cresy.

Greek-street, Saturday, 15th December 1849.

Correspondence, &c.

SUMMARY.

I.—The Thames.

1. Receiving the whole drainage of metropolis by means of old sewers - - - 4
2. Receiving whole drainage by marginal sewers - - - - - - - - 1
3. Receiving overflow drainage only, pumped by steam-engines, from reservoirs in marshes below London, after filtration:—
   - (*a*) By sewers along the banks of the river in conjunction with Thames embankment - - - - - - - - - - - - 4
   - (*b*) By iron tube sunk into trench dredged in mud banks - - - - 9
   - (*c*) By an inland tunnel on each side of the river running in parallel directions to the reservoirs - - - - - - - - - - 16
   - (*d*) By single tunnel under river to one reservoir - - - - - 5
4. Receiving overflow from sumpts, with distribution of sewage manure - - - 10
5. Receiving overflow from intercepting tanks, in connexion with existing sewers, after the subtraction of solid manure - - - - - - - - - - 26

II.—The Country.

Receiving the whole drainage of the metropolis, in the form of sewage manure, by means of pumping engines and distributory channels:—

- (*a*) With discharge into the sea - - - - - - - - - 3
- (*b*) With discharge into pervious strata - - - - - - - - 2
- (*c*) With discharge unprovided - - - - - - - - - 6

116

Plans for the Drainage of London, sent in to the Honourable Metropolitan Commission, classified according to their several Outlets.

I.—The Thames.

1. *Receiving the whole Drainage by means of the Old Sewers.*

Jas. McCabe - - -	Present sewers continued to bed of river.
Professor Wallace - -	By water-supply for flushing.
William Radford - -	By continuing old sewers to bed of river.
H. E. Scott - - -	By supply of water for flushing, admitted at high-water, and let off at low-water.

2. *Receiving the whole Drainage by means of Marginal Sewers.*

William Lane - - -	Discharges at Blackwall; lateral openings to admit Thames to flush.

3. *Receiving the Overflow Drainage* only, *pumped by Steam-engines, from Reservoirs in Marshes below London, after Filtration and Preparation of Solid Manure.*

(*a*) By sewers along the banks of the river in conjunction with Thames embankment.

Sir T. Tancred - -	Surface-water into Thames.
J. Martin - - -	Ventilation; supply of water; separation of drainage.
W. H. Smith (Nunc aut Nunquam) - -	Separation of surface and sewage water; water supply; railway termini connecting projects.

(*b*) By iron tube sunk into trench dredged in mud banks.

H. Francis - - -	—
Captain Hansler - -	—
Captain Moorsom - -	—
W. Macbay - - -	Supply of water by pipe round London at Regent and Surrey Canals.
Jas. Pilbrow - - -	—
Ross and Low - -	—
J. Sutton - - -	—
N. Scott - - -	—
Thos. Watts - - -	Two sewers on each side.

(*c*) By

Correspondence, &c.

(*c.*) By an inland tunnel on each side of the river, running in parallel directions to the reservoir.

A. B.	Suggestions in conjunction with sumpts.
J. H. Clive	Separation of drainage area and waters; sumpts for low districts.
A. Doull	Separation of drainage; use of water-power.
Jos. Gibbs	Supply of water; sapping sewers; adits.
C. F. G.	—
Chas. Ellerman	—
Chas. Henman	—
Labitur et Labetur	Flushing by Thames.
J. Martin	Ditto.
Rumball and Sheppard	—
Wm. Stewart	—
H. H. Bird	—
Sir S. Brown	—
B. G. Sloper	In partial conjunction with sumpt system.
J. Bowron	Surface water by Thames; water supply.
H. White	—
Thos. Hawkins	—
G. Burge	—
Jas. Dean	—
J. Faulkner	—
J. Harrison	Separation of drainage area; solid manure.
Jno. Edwards	Pneumatic apparatus; syphon sewers.
Alfred Giles	—
J. B.	—
J. Murray	Separation of drainage area.
F. Roe	—
P. Smith	—
F. Wood	—
Richard Bodington	—
G. Shepherd	Marginal sewer to the Tower, thence cutting inland.
R. D. Tennent	—
S. Wise	Double tunnel; water-supply; house drainage.
J. W. Couchman	In combination with sumpts; separation of surface and sewerage waters.
Dredge and Stevenson	Separation of surface and sewerage water.
Michael Haire	Flushing by pumping from Thames.
J. B. Denton	Separation of drainage area; water-supply.
Greaves and Barlow	Flushing and agitating.
F. Hawkes	Supply of water from Kingston.
Nasmyth and Statham	Flushing head at Battersea.
Geo. Remington	—
Chas. Sanderson	—
H. Thompson	—
Jos. A. Borsley	—
L. F. Page	From reservoirs; surface waters into Thames.
J. Tebay	Supply of water; flushing.
D. Warren	—
J. B. M'Clean	Natural discharge into river; separation of upland and low districts; tunnel under river.

(*d*) By single tunnel under river to one reservoir.

W. Cole	—
Thos. Holditch	—
R. Netherway	Separation of drainage; discharge into Brent and Roding rivers.
C. B. Allen	Depôt below Gravesend; double way; house drains.
X. Y. Z.	Centipedal drain.

4. *Receiving Overflow from Sumpts with Distribution of Sewage Manure.*

H. Austin	Separation of drainage area; catchwater drains; sewage manure.
J. T. Barkley	Separation of drainage; solid manure.
William Bardwell	—
John Elliott	—
Maurice Kerridge	Separation of drainage.
Hon. J. S. Kennedy	Tunnel above London; distribution along railways.
H. Pinkus	Sewage manure, pumped by pneumatic apparatus, with ventilation and flushing, steam vacuum and mill power.
Baron Von Rathen	Worked by air compressing engines.
T. Morris	Separation of drainage area and waters.
John Adams	Flushing by pumping from Thames.

Correspondence, &c.

5. *Receiving Overflow from intercepting Tanks in connexion with existing Sewers, after the Subtraction of Solid Manure.*

C. Cox	—
J. P. Smith	—
Tate and Gilmore	Rails for removal of refuse.
J. Jones	Sewage conveyed by railway.
R. Dover	—
F. Drayson	Separation of drainage.
J. Elliott	—
Engineer	—
Fiat Justitia	—
J. Prestwich, jun.	Tunnels up the river.
J. Cundy	—
J. B. Redman	Separation of surface and sewage water; distribution of sewage manure.
T. Lunt	Cesspool to each house.
T. W. Plum	Soil tanks.
Jasper Rogers	Deodorizing moveable tanks; public conveniences.
B. Stratton	Moveable cesspools every 24 hours.
Walter Smith	Moveable cesspool; liquid house drainage into iron channel in the bed of river.
W. Stewart	Moveable cesspools.
J. Wilkinson	—
H. C. Daubeny	—
F. Coxworthy	Solid manure removed by railway in sewer.
W. B. Moffat	—
J. B. Milne	Separation of solid; chimney ventilation.
R. Needham	Filtration by hydraulic pressure.
Messrs. Pontifex	Solid manure by barges; liquid by tunnel in bed of river.
Chas. Egington	—

II.—The Country.

Receiving the whole Drainage of London in the form of Sewage Manure, by means of Pumping Engines and Distributing Channels.

F. Finlay	Diverging tunnels.
Richard Dickson	Sumpts into Artesian bed; separation of drainage.
C. Fowler	Sumpts and diverging discharge pipes.
W. W. C.	Distribution of sewage manure with overflow into the sea. *Ocean scheme.*
Z. A.	Grand metropolitan sewer-duct.
C. Burn	Flushing by Thames water.
J. Elmes	Discharge through gravelly bed.
J. V.	Diverging tunnels, engines to each; flushing.
J. Phillips	*Tunnel scheme.* Distribution of sewage manure; overflow to sea at Dymchurch Wall; separation of surface and sewer water.
J. Bethel	Sewage manure by iron pipe along railways.
Admiral Tayler	Brick sewer from London to Beechey Head.

Miscellaneous.

M. Dunn	Supply of water by tunnelling from the river, and pumping into sewers for flushing.
H. L. S.	Plan of filtering tank.
W. Radley	Proposing the admixture of chemical agents.
R. Rettie	Claiming originality of the idea of a tunnel scheme.
F. Swinburne	Proposing to deodorize fœculent matters.
E. Wharmby	Proposing gully-grates and ventilation of sewers.
R. Cort	[Will send a plan on conditions.]
R. G. Coke	Suggestions for flushing.
C. Egington	Scheme for disinfection and manufacture of solid manure.
Yates and Freebody	Plans for water-supply from Thames above Windsor.
G. Gurney	Proposing to discharge into Thames at ebb-tide only.
Thomas Hay	Proposals for ventilation of sewers.
R. Needham	Plan for filtering sewage by hydraulic pressure.
Onalar	A long unconnected and unintelligible paper.
An Old Commissioner	Historical statement referring to "Old Commission."
H. Phillips	Reservoirs at mouths of sewers and trapping gullies.
M. L. Salter	The rising shaft system.
Captain E. Smith	Chain scrapers to be used in sewers, disinfecting fluids, and ventilation.

G. Wood

G. Wood - - - -	Large reservoirs for drying manure.
John White - - - -	Proposing an additional supply of water from the River Brent.
N. C. R. - - - -	Suggestion for house drainage.

Total of Miscellaneous Suggestions - - - -	21
Total of Plans for Drainage - - - - -	116
General Total of all examined by us - - -	137

Supplementary List,

Containing the Names of Authors of Plans, proposing Separation of House and Surface Drainage, irrespective of the Engineering Means by which such Drainage is effected.

Barkley, J. T.	Egington, C.	Page, L. F.
Bowron, J.	Edwards, J.	Phillips, J.
Clive, J. H.	Finlay, F.	Plum, T. W.
Couchman, J. W.	Kerridge, M.	Redman, J. B.
Denton, J. B.	Lunt, T.	Scott, H. E.
Dixon, R.	Martin, J.	Smith, W. H.
Doull, A.	Moorsom, Captain.	Tancred, Sir T.
Drayson, F.	Morris, J.	Z. A.
Dredge & Stephenson.	Netherway, R.	

P. S.—We may perhaps be permitted to state that, with every possible care to ensure accuracy, omissions have possibly occurred in the preceding list. Frequently the author's descriptive memoir will consist of 100 pages, and a single note, to the effect "that the surface drainage is to be carried off by old sewers," expresses the whole idea of separation.

(signed) *Edward Cresy.*
J. W. Bazalgette.

N. B.—The above Summary includes all plans sent in on or before the 15th December 1849.

No. 30.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Gentlemen, Whitehall, 23 August 1853.

I am directed by Viscount Palmerston to transmit to you the enclosed letter of Mrs. Elizabeth Ruth Banister, relative to her plan for the drainage of London and towns generally, stated to have been submitted by her to the late Mr. F. Forster; and I am to request that you will return the same, and inform Lord Palmerston whether the plan referred to is in your possession.

I am, &c.
(signed) *H. Waddington.*

No. 31.

H. Waddington, Esq., to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 24 August 1853.

I am directed by Viscount Palmerston to transmit to you the enclosed application from inhabitants of Barrington Crescent, Loughborough Road, Brixton, relative to the sewerage of that locality; and I am to request that you will return the same to me, and report upon the statements contained therein for Lord Palmerston's information.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 31.

To the Right Honourable Lord Viscount *Palmerston*, Her Majesty's Secretary for Home Affairs.

6 August 1853.

We, the undersigned inhabitants of Barrington Crescent, Loughborough Road, Brixton, beg most respectfully to address your Lordship, bringing before your notice the inconve-

Correspondence, &c.

nience we suffer on account of imperfect drainage and want of a common sewer. Having appealed to the Metropolitan Commissioners without obtaining any redress, and understanding from Mr. Morewood that no relief is contemplated to meet our urgent requirements, but that borrowing powers are sought to be obtained by the Commissioners for constructing a sewer from Wandsworth through the Battersea Fields, entirely unnecessary for the present population, we earnestly request that our case may receive due attention, rather than a plan for expending money upon works not yet required. Our sewerage consists of a six-inch drain into a cesspool in a field, from which black refuse overflows, giving off a fœtid stench, contaminating the atmosphere of the central portion of the crescent. Whenever heavy rain falls, the drains burst up, overflowing the kitchens and gardens of the houses; and so bad are the gases arising from the sinks of the same, that a lighted candle being brought in contact with them, they ignite with an explosion, and burn to a height of several feet. This has been done daily at No. 18, and although the drains have lately been cleansed, the same stench and gases remain but little abated.*

Considering how small would be the cost of constructing a communicating sewer for this crescent, for which we actually pay sewers rate, we trust your Lordship will give due consideration to our appeal, and afford us relief.

We beg, &c.

[Here follow the signatures of 31 persons, inhabitants of Barrington Crescent.]

* This cannot arise from common gas, as there is no gas laid on.

No. 32.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 26 August 1853.

In reply to your letter of the 23d instant, enclosing a letter from Mrs. Elizabeth R. Banister (herewith returned) relating to a plan of the drainage of London and towns generally, submitted by her to the late Mr. Forster, I beg to state, for the information of Lord Palmerston, that the plan or model referred to in that lady's letter, together with some notes and memoranda apparently in her handwriting, relating to her scheme, are amongst the papers of the late Mr. Forster, now in the possession of the Commissioners of Sewers.

I have, &c.
(signed) *Richard Jebb*, Chairman.

No. 33.

H. Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 30 August 1853.

Having laid before Viscount Palmerston your letter of the 28th ultimo, reporting upon the memorial from certain of the inhabitants of West Hackney, Stoke Newington, and Stamford Hill, which was referred to you on the 21st ultimo, I am directed by his Lordship to request that the Commissioners of Sewers will invite a deputation from West Hackney, &c., to meet them, and to discuss with them the arrangements which the Commissioners propose to make for draining the district, and that the Commissioners will report to Lord Palmerston the result of such meeting before any plan is decided upon.

I am, &c.
(signed) *H. Waddington.*

No. 34.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Metropolitan Sewers Office, 1, Greek-street, Soho,
Sir, 31 August 1853.

In compliance with the directions of Viscount Palmerston to the Metropolitan Commissioners of Sewers, conveyed in your letter of the 24th instant, to report upon the statements contained in a memorial (herewith returned) from inhabitants of Barrington Crescent, Loughborough Road, Brixton, I have the honour, in the name of the Commissioners, to report as follows, for his Lordship's information.

The

Correspondence, &c.

The only representations on the subject addressed to the Commissioners consist of separate letters, all dated last month, from three of the memorialists; viz., from Mr. Joseph Glass on the 6th, from Mr. S. Angell on the 7th, and from Mr. C. W. Sharpe on the 12th ultimo, complaining of the want of drainage in the crescent, and each suggesting the same mode; an impracticable mode, as afterwards reported by the engineer, of remedying the evil. The matter was attended to as promptly as the great press of business in this office would permit; but some delay unavoidably occurred. Yesterday the Commissioners, assembled in general committee, considered the subject, and decided that this is not a case in which relief ought to be afforded at the cost of the district; which decision will be forthwith communicated to the parties. It is proper to observe that great misapprehensions prevail as to the nature of the works intended to be paid for out of the district sewers rates. Not only does the law regard the work in question as one which the owners of Barrington-crescent ought themselves to do at their own expense, but it would be the duty of the Commissioners to compel them to execute it, were they not prevented from enforcing this obligation by the very inefficient provision which the Act of Parliament relating to this subject has made for carrying out its objects.

With respect to the allegation in the memorial, that the sewer referred to from Wandsworth through the Battersea Fields would be unnecessary, it may be sufficient to state, in answer, that the memorialists are misinformed; however, it may be right to add, that at present the Commissioners are unable to undertake this important work, because of the limited amount of money which they are empowered to borrow under the renewal Act of the Session just passed; a cause which must prevent the Commissioners from carrying out very many works still more urgently needed than that now required by the memorialists (bad as the state of Barrington-crescent undoubtedly is), and which moreover are, either not at all, or not so clearly, subjects of private obligation.

I have, &c.
(signed) *Richard Jebb*, Chairman.

No. 35.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir,], Greek-street, Soho, 1 September 1853.

I HAVE the honour to acknowledge the receipt of your letter of the 30th August, conveying the directions of Lord Palmerston to the Commissioners of Sewers, in reference to the arrangements they propose to make for draining the district mentioned in the memorial recently presented to his Lordship from certain inhabitants of West Hackney, &c.; in pursuance of which I beg to state, that steps are now being taken to arrange a meeting early next week between a deputation from the inhabitants of that district and the Commissioners; the result of which meeting shall be communicated to his Lordship before any plan is decided upon.

I have, &c.
(signed) *Richard Jebb.*

No. 36.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 2 September 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed letter, complaining of the sewer passing through Penny Fields and North-street, Poplar.

95, Fore-street, Limehouse. 29 August. D. Dunbar.

And I am to request that you will return the same to me, and report, for Lord Palmerston's information, upon the matter referred to therein.

I am, &c.
(signed) *H. Waddington.*

Correspondence, &c.

Enclosure with No. 36.

D. Dunbar, Esq., to the Right honourable Viscount *Palmerston*.

95, Fore-street, Limehouse, London,
My Lord, 29 August 1853.

A CASE of cholera having already occurred in this neighbourhood, I deem it right that you should be informed that further cases are apprehended from the horrible stench from the sewer passing through Penny Fields and North-street, Poplar, and discharging itself into Limekiln Dock. This smell is caused by the refuse of gas works being allowed to be discharged into the public sewer, and which is contrary to law, and I trust your Lordship will direct the Commissioners of Sewers to remedy the evil.

I am, &c.
(signed) *D. Dunbar.*

I consider the stench more fatal than that of the churchyards.

No. 37.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 6 September 1851.

I HAVE the honour to acknowledge the receipt of your letter of the 2d instant, transmitting a letter, herewith returned, from Mr. D. Dunbar, complaining of the sewer passing through Penny Fields and North-street, Poplar; and, in compliance with the directions contained in your letter, I beg to report, for the information of Viscount Palmerston, that the complaint of Mr. Dunbar appears to be well founded.

The noxious smells mentioned by him seem to be attributable to the cause he assigns, namely, the discharge of the refuse of gas into the sewer in question. This source of annoyance has been attributed to the acts of particular parties, and much difficulty has hitherto been experienced by the officers of this Commission in obtaining legal evidence as to these acts. Active steps, however, are now in prosecution to discover the offenders, and to put the law in force against them.

I have, &c.
(signed) *Richard Jebb.*

No. 38.

Horatio Waddington, Esq., to *Richard Jebb*, Esq.

Sir, Whitehall, 6 September 1853.

I HAVE laid before Viscount Palmerston your letter of the 26th ultimo, and I am directed to request that you will inform his Lordship of the nature and merits of Mrs. Elizabeth R. Banister's plan for the drainage of London, and towns generally, referred to in your letter, and whether it differed essentially from other schemes.

I am, &c.
(signed) *H. Waddington.*

No. 39.

E. H. Woolrych, Esq., to *Horatio Waddington*, Esq.

Sewers Office, 1, Greek-street, Soho,
Sir, 8 September 1853.

I BEG to acknowledge the receipt of your letter of the 6th instant, addressed to Mr. Jebb, chairman of this Commission, relative to the plan of drainage of Mrs. Elizabeth R. Bannister, and to state that Mr. Jebb is absent from London, but is expected to return in about ten days.

I am, &c.
(signed) *E. H. Woolrych,*
Secretary.

No. 40.

No. 40.

H. Waddington, Esq., to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 10 September 1853.

I AM directed by Viscount Palmerston to request that you will obtain from your consulting engineers a report as to their opinion as to the relative importance of the drainage works proposed to be executed under the powers given by the Act of last Session, and as to the best manner of constructing those works.

I am to state that his Lordship is disposed to think that the most urgent of the proposed works are, first, the great main sewer proposed for the south bank of the Thames, and, secondly, the drainage works for the Hackney Brook district.

The flat district in South Bank, extending from Lambeth to Greenwich, being generally much on a level with the water-line of the Thames, is much in need of some great relieving sewer; and it appears to his Lordship that the main sewer to be constructed for that purpose ought to be continued on to Deptford. This work seems to his Lordship to be the one which ought to be the first object of attention.

The Hackney Brook district appears to be that which next requires drainage works; but upon both of these districts, as well as upon the works required in other parts within the metropolitan limits, Lord Palmerston wishes to have the opinion of your Board and of your consulting engineers.

You should bear in mind that it is his Lordship's intention to bring a Bill into Parliament, in the early part of next Session, for the purpose of reconstructing your Commission, for placing it on a more permanent footing, and for giving it greater powers of raising money. That Bill, it may be hoped, may pass before Easter; and therefore the money which the Act of last Session enables you to raise, may be considered as applicable to works to be executed between the present time and Easter next, and it will consequently be nearly as much as you could expend in that time.

I am, &c.
(signed) *H. Waddington.*

No. 41.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 12 September 1853.

I AM directed by Viscount Palmerston to request that you will inform his Lordship what steps you are taking to execute the drainage works for which the Act of last Session has given you powers, and especially what preparations you are making for draining the districts on the south side of the Thames.

I am, &c.
(signed) *H. Waddington.*

No. 42.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 13 September 1853.

I AM directed by Viscount Palmerston to transmit, for your report thereon, the enclosed letter of Mr. John Brown, of 281, High-street, Poplar, complaining of a nuisance occasioned by the common sewer.

5 September 1853

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 42.

281, High-street, Poplar,
Honoured Sir, 5 September 1853.

I AM sorry to be compelled to trouble you with my application respecting the nuisance experienced by myself and family from the common sewer. The unwholesome effects arising therefrom turn all the metal goods, directly they are cleaned, to a lead colour. The paint

Correspondence, &c.

paint of my house (inside) is light stone colour, which is also changed to a dark lead colour from the stench. The health of my family is very much impaired by it; that they are disturbed at night by its stench; our eyes are affected by it when coming from our bedrooms. The appetite of all is almost destroyed. We have the sensation of sickness, accompanied with a severe headache, and the health seriously affected. The paint, instead of being its proper colour, is the colour of a privy-lid placed over a common cesspool. I have written to the Commissioners of Sewers repeatedly, but there has been nothing done, further than three replies, copies of which I have sent below to you.

No. $\frac{4267.}{5641.}$

"Metropolitan Commission of Sewers,
"Sir, "No. 1, Greek-street, Soho, 3 June 1853.
"I BEG to acknowledge the receipt of your letter of the 30th ultimo, and to inform you that it has been referred to the proper officer for attention and report.

"I am, &c.
"Mr. J. Brown, (signed) "*E. H. Woolrych*,
"281, High-street, Poplar. "Secretary."

No. 4382.

"Metropolitan Commission of Sewers,
"Sir, "No. 1, Greek-street, Soho, 11 June 1853.
"I BEG to inform you that the engineer of the district, to whom your former letter respecting the sewer at Poplar was referred, reports that there is reason to believe that the offensive condition of the sewer arises from the discharge of gas refuse into such sewer. Endeavours are being made to ascertain by whom such acts have been committed, in order that measures may be adopted for compelling the immediate discontinuance of such practice.

"I am, &c.
"Mr. J. Brown, (signed) "*E. H. Woolrych*,
"281, High-street, Poplar. "Secretary."

No. $\frac{290}{7012}$.

"Metropolitan Commission of Sewers,
"Sir, "No. 1, Greek-street, Soho, 12 August 1853.
"I BEG to inform you that the attention of the gas companies has been called to the existence of the nuisance complained of in your letter of the 5th instant, and the engineer of the district has been instructed to take such proceedings as it is hoped will put an end to the evils from which you are suffering.

"I am, &c.
"Mr. J. Brown, (signed) "*E. H. Woolrych*,
"281, High-street, Poplar. "Secretary."

I shall feel greatly obliged by your Honour sending some person to inspect my premises, as they are quite unfit for habitation, and much surpass the idea of any one as to their state. I gave a great premium for my business, which, if there is no remedy or alteration, I shall be obliged to relinquish.

Every one in the neighbourhood is suffering from the effects.

Trusting to your Honour's kind attention to the foregoing,

I am, &c.
Sir James Graham, bart. (signed) *John Brown.*

No. 43.

E. H. Woolrych, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 14 September 1853.

I HAVE the honour, pursuant to the instructions of the Metropolitan Commissioners of Sewers, to acknowledge the receipt of your letters, dated 10th and 12th September, and to acquaint you, for the information of Viscount Palmerston, that the Commissioners have, with the view of carrying out, at the earliest practicable period, the main line of sewer for the south side of the Thames, given directions that immediate steps should be taken for effecting a loan of 200,000 *l.* on the security of the sewers rates; and that meanwhile their officers are actively engaged in preparing the requisite plans and drawings for the contracts; that the plans for the Hackney Brook, or high level intercepting sewer, on the north of the Thames, have been laid before Sir William Cubitt for his consideration; and that he has expressed his approval of the design, and has been requested to attend a meeting

a meeting of the Commissioners, to be held at this office on Tuesday, the 20th instant, for the purpose of discussing with them the details of the scheme; after which he will be prepared to make an official report on the subject. The Commissioners desire me to state, further, that the plans for the line of main drainage south of the Thames are in the course of preparation; and as soon as they are completed, which it is expected will be the case in the course of a fortnight or three weeks, they will be laid before Sir William Cubitt for his opinion and report, and also before Mr. R. Stephenson, who it is anticipated will have then returned from Canada. I beg to add, that the Commissioners concur in the opinion expressed by Viscount Palmerston, that the works most urgently required are the main line of sewer on the south of the Thames, and the works connected with it; and that the high level intercepting sewer north of the Thames is next in order of importance; and that, so soon as the Commissioners shall have received the report of their consulting engineers on these as well as on such other works as they will be enabled to carry out with the funds at their disposal, between the present time and Easter next, the purport of that report shall be communicated to you, for the information of his Lordship.

I have, &c.
(signed) *E. H. Woolrych*,
Secretary.

No. 44.

E. H. Woolrych, Esq., to *Horatio Waddington*, Esq.

Sewers Office, 1, Greek-street, Soho,
Sir, 15 September 1853.

I BEG to inform you that your letter of the 13th instant, transmitting a letter from Mr. John Brown, relative to a nuisance arising from a sewer at High-street, Poplar, shall be laid before the Metropolitan Commissioners of Sewers at their next meeting.

I have, &c.
(signed) *E. H. Woolrych*,
Secretary.

No. 45.

The Honourable *Henry Fitzroy* to the Commissioners of Sewers.

Gentlemen, Whitehall, 21 September 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a report issued by the Guardians of the parish of Camberwell to the rate-payers of the parish; and I am to call your attention to that portion of the document which relates to the management of the sewers.

I am, &c.
(signed) *Henry Fitzroy*.

Enclosure with No. 45.

REPORT from the Board of Guardians of the Parish of *Camberwell* to the Rate-payers.

THE probability that a renewal of the Metropolitan Sewers Act will be passed during the present Session of the Parliament, and the fact that another sewers rate of 6*d*. in the pound has just been imposed upon the inhabitants of this parish, induces the Guardians of the Poor to submit to their brother ratepayers a few observations on this important subject, to make known as extensively as possible the difficulties they have had to encounter in discharge of their own duties through the total absence of local influence in the management of the sewers; how grievously the drainage of this parish has been neglected, as well as how mischievous and inefficient is the existing system of sewers administration; and to point to such remedies as, from their experience, they feel justified in recommending to the consideration and support of the rate-payers, in the hope that, by the exercise of more extended influence, those inconsistencies in recent legislation which have created and empowered one body of central administrators to counteract by their proceedings the measures of benefit left to local administration, under the guidance of another and distinct central authority, may be speedily rectified.

It is now upwards of four years since the Guardians were called upon to assume the title

Correspondence, &c.

and functions of local board of health; and it will at once be seen how anomalous that title and those functions must be in the hands of any local body, while the entire and arbitrary management of the sewers and drainage, those essential elements by which the healthfulness of a populous district can alone be successfully regulated, was in the hands of an independent and irresponsible central board; and it was so in practice, for while the local authorities were (as far as their limited power extended) using their best exertions to remove the causes of epidemic disease in their department, the officers and servants of the Sewers Commission were busily engaged in the execution of works calculated to produce, and, in fact, did produce, the most opposite results. It was in vain the Guardians complained and protested, which they did in the strongest possible terms, against the proceedings referred to; they were at the time stoutly defended, and as strongly persisted in; but at length a new light seems to have broken upon the Commissioners, or to have been externally forced upon them: the objectionable practices have been to a great extent abandoned, and some of them even carefully prohibited.

It will be remembered by many, that these circumstances were made known to a vestry of the parish in June 1850, when petitions to Parliament, embodying similar views to these now expressed, were unanimously adopted; but as nearly three years have elapsed, and no change for the better either made, or understood to be in contemplation, and as our local grievances remain to a large extent unabated, and it not unfrequently occurs that nearly a month is consumed in correspondence upon matters of simple detail, which, though trifling in themselves, often stand in need of prompt attention, it seems important, at this juncture, that the question should be generally understood, and that the necessity, as well as the practicability, of providing a more consistent and more satisfactory system, should be impressed upon the public mind, besides being urged upon the attention of the Legislature; it having been erroneously supposed by many, that the entire management of the sewers must of necessity remain in the hands of a central authority.

The Guardians of the Poor, as conservators (as far as practicable in that capacity) of the health of the poor, have for many years necessarily been compelled to give attention to the sanitary condition of certain portions of the parish, without, however, the power of improving it, although they have occasionally felt constrained to overstep their strict line of authority, under circumstances of pressing urgency. It is not their purpose to detail herein the extent to which those portions of the parish particularly referred to have suffered, and continue to suffer, in some instances, from the existence of defective, and in others the absence of proper drainage, nor to enumerate the various reports and representations which have, from time to time, during the past 15 years, been made to different public authorities upon the subject; the expectations from all such, as well as those held out so prominently on the appointment of the Central Sewers Commission, now several years back, have brought the parish of Camberwell but little benefit indeed, if any, in return for the large amount of money paid in sewers rates by the inhabitants.

The Guardians feel bound to add, that no hope of improvement can be entertained until the system is completely changed; until, in fact, a share in the management of the sewers shall be given to a local Board of ratepayers, who, standing between the central authority (for such it is admitted there must be) and the inhabitants of the district they represent, may, on the one hand, in the making and collecting of the rates and supervising the expenditure be held responsible in that respect; and who may, on the other hand, be expected, by the exercise of a proper degree of sympathy, to give a willing ear and ready reply at least, if not always a remedy, for local grievances.

It is indisputable that by far the largest portion of the details of sewer administration could be more promptly, as well as more efficiently, performed by a "Local Board of Works," which Board, when constituted, might be also entrusted with the execution of all measures bearing upon the sanitary condition of their district, leaving such main works only as should extend to more than one local district to central management, which, with the duty of attending to the uniformity in the proceedings and unity of action in the district Boards, would be fully as much as any central body could properly transact for this large and increasing Metropolis, and certainly as much as any central authority ought to be entrusted with in matters of such extensive local concern, without danger, by precedent and otherwise, to the interests of the ratepayers, whose inherent right to a share at least in their own local government has been recently declared by a Minister of the Crown in the House of Commons, should be regarded as a material element in the prosperity and internal peace of this country.

Having expressed their sentiments upon the subject which appeared to give occasion for this report, it may be expected the Guardians should, through the same medium, say a few words in reference to their more legitimate business as Guardians of the Poor. In this, it is truly gratifying to them to be able to mention, that while the number of poor persons relieved in the parish in the last week of the years 1845 and 1850 were respectively 600 and 1,653 (and at one time rose to 1,724), showing an average increase of about 35 per cent. per annum, the number relieved in the corresponding week of the last year 1852 was 1,227, being a decrease of nearly 26 per cent. upon the two years, the Guardians have thus been enabled to reduce progressively their half-yearly demand upon the parish officers, from 10,000 *l.*, the amount of it for the first half of the year 1850, to 5,600 *l.* (inclusive of the county rate) for the first half of the present year. Upon this reduced estimate, it appears the parish officers have been able to fix the rate just now published at 9 *d.* in the pound, which is believed to be the lowest rate for "poor," "county," and "police," remembered to have been made in the parish.

The

The condition of the parish in respect to the number and cost of the poor having changed so materially during the past few years, it may be desirable to give, for the purposes of comparison, the actual expenditure in several. The following amounts include emigration, vaccination, registration, and sanitary charges, but are exclusive of the county rate; viz.—

		Total Number Relieved.	EXPENDITURE.		
			£.	s.	d.
Yearly, ended Lady-day	1846	1,429	7,980	4	5
„ „	1847	1,667	9,051	3	10
„ „	1848	2,832	12,459	5	3
„ „	1849	4,296	13,872	10	4
„ „	1850	4,584	13,073	16	8
„ „	1851	3,370	12,089	4	11
„ „	1852	3,107	10,476	12	9
„ „	1853	(estimated)	9,400	–	–

So large was the increase in the number of chargeable poor between March 1846 and March 1847, amounting to 45 per cent., that the increased cost of relief upon that year alone was no less than 1,290 *l.*, being, in fact, more than the total increase in the expenditure; and the increase in the cost of relief the following year, ended March 1848, amounted to the still larger sum of 2,993 *l.*, over and above the previous year. Although this alarming increase in the pauperism of the parish was at the time to be accounted for by a variety of circumstances, it happened that the workhouse was neither adequate in extent, nor fit in its arrangement as to classification and facilities for efficient management, to enable the Guardians to use it as a check to the rapidly increasing demands upon the parish funds. It was necessary in 1847 to farm out a considerable number of the aged poor, at an expense and under circumstances that could not be consistently continued; and although these considerations had, during the two previous years, pressed upon the attention of the successive Boards, it was not until after the election in 1848, that any steps were taken towards meeting the necessity of the parish in this respect.

By the time the increased accommodation was ready, the number of inmates had (notwithstanding every effort to diminish it) risen to within 60 of the total number provided for, viz. 480, which left a margin of only 10 for each of the six classes of inmates; viz. 1, aged men; 2, able-bodied men; 3, boys; 4, aged women; 5, able-bodied women; 6, girls; but, fortunately for the parish the tide of pauperism has been subsequently turned in a contrary direction. The numbers in the house, however, did not materially diminish till after the spring of 1851, during which it appears they were again within 60 of the total number.

It has been evident to the Board that the subsequent reduction in the in-door as well as the out-door relief is attributable mainly to the influence of improved classification and discipline in the workhouse; admission orders have been offered to 2,680 persons, during the years 1851 and 1852, a large portion of which were not accepted; and on comparing the total number of chargeable poor on the 1st of January in the present year with the number on the 1st of January 1850, the average decrease for the whole of England is only 14·16 per cent., while the like comparison for this parish alone shows a decrease of no less than 42·67 per cent. The Guardians are, however, extremely happy to be able to refer to other and far more satisfactory causes for the diminution in the number (amounting to 7 out of the 42 per cent.) who have, during the past year, been compelled to seek parish relief; viz., the increased prosperity of the working classes generally, influenced by circumstances which, doubtless, every ratepayer will be able to perceive and appreciate.

It is gratifying to the Guardians to be able to close their term of office under circumstances which cannot fail to be a source of satisfaction to all concerned, and they only hope the condition of the labouring classes may continue to improve, and that the reduced expenditure may continue so favourably to affect the amount of the parochial rates.

Signed, by order of the Board of Guardians,

Thomas W. Plum, Clerk.

Board Room, Camberwell,
March 1853.

Correspondence, &c.

No. 46.

Richard Jebb, Esq., to the Honourable *Henry Fitzroy*.

Sir, 23 September 1853.

I HAVE to acknowledge the receipt of your letter of the 21st instant, addressed to the Metropolitan Commissioners of Sewers, transmitting, by direction of Viscount Palmerston, a copy of a report issued by the Guardians of the parish of Camberwell to the ratepayers of the parish, and to inform you that the same shall be laid before the Commissioners at their next meeting.

I have, &c.
(signed) *Richard Jebb.*

No. 47.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 23 September 1853.

IN reply to your letter of the 6th instant, requesting me to inform Viscount Palmerston of the nature and merits of Mrs. Elizabeth R. Banisters' plan for the drainage of London and towns generally, and whether it differed essentially from other schemes, I beg to state, for his Lordship's information, that the plan in question appears to be unique; that it involves the construction of innumerable sewerage tanks throughout the metropolis, and the formation of additional sewers at depths and of forms wholly at variance with those hitherto adopted; and that it appears in other respects, so far as it is intelligible, to be altogether impracticable. The description of it submitted to the late Mr. Forster, formerly engineer to this Commission, is substantially embodied in the exposition contained in the printed letter since addressed by her to Viscount Palmerston, and it was illustrated by a pasteboard model deposited by her at this office, which I have the honour to transmit.

I have, &c.
(signed) *Richard Jebb.*

No. 48.

The Honourable *H. Fitzroy*, M.P., to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 23 September 1853.

REFERRING to the observations submitted in Mr. Jebb's letter of the 26th January last, relative to the great lines of drainage proposed to be taken by the Metropolitan Commissioners of Sewers, I am directed by Viscount Palmerston to request that you will inform him whether you have had the opinion and report of your consulting engineers on these plans. His Lordship also wishes to know whether it would not be advisable that the large tunnels which are to be the deep intercepting sewers, to prevent the sewage of London from falling into the Thames, should be made of iron instead of brick. Iron tunnels would be much less liable to injury by friction within, or by sinking of the ground on which they rested, than brick tunnels would be.

I am, &c.
(signed) *Henry Fitzroy.*

No. 49.

Richard Jebb, Esq., to the Honourable *Henry Fitzroy*.

Sir, 1, Greek-street, Soho, 28 September 1853.

IN reply to your letter of the 23d instant, addressed to the Metropolitan Commissioners of Sewers, I beg to state, for the information of Viscount Palmerston, that the Commissioners have not yet received the opinion and report of their consulting engineers on the plans for the main drainage of London, mentioned in my letter to Mr. Waddington, of the 26th January last.

I beg

I beg further to state, that the other question contained in your letter, namely, respecting the material to be employed for the great tunnel intercepting sewers, was considered by the Commissioners yesterday, and they are of opinion that it would not be advisable to construct those sewers of iron. Upon this subject, I have the honour to transmit a Report of Mr. Bazalgette, engineer to this Commission.

I have, &c.
(signed) *Richard Jebb.*

Enclosure with No. 49.

J. W. Bazalgette, Esq., to *Richard Jebb*, Esq.

As to constructing the Intercepting Sewers of Iron, instead of Brick.

Sir, 1, Greek-street, Soho-square, 24 September 1853.

I HAVE considered this proposition, and it appears to me that the advantage to be gained by the general substitution of iron for brick in these works would not be commensurate with the enormous additional cost. It is proposed to substitute iron in those parts of the work where peculiar engineering difficulties present themselves; but if the inverts of the sewers are built of the best bricks laid on end, in cement, as is proposed, past experience leads me to the conclusion, that no fears need be entertained of injury by friction from within. If the ground through which the sewer would pass is good and firm, there will be no sinking; and if the ground is bad, it will be necessary, with either material, to make an artificial foundation upon which to build the sewer.

I have, &c.
(signed) *J. W. Bazalgette.*

No. 50.

(Transmitted from the Home Office to Mr. *Jebb.*)

Mr. *J. W. Dover* to the Right Honourable Viscount *Palmerston*, M.P., G.C.B.

(Immediate.)

My Lord, 9, Albion-terrace, Wandsworth-road, 1 October 1853.

THE daily papers just apprise me that a deputation, headed by the Rector of Clapham, has had a conference with the Commissioners of Sewers regarding the yeleped "Black Ditch," and which these gentlemen, some of them living at a great distance from it, are desirous should *now* be cleaned out. Could I have seen the name of Mr. Philips, a gentleman in the higher department of the Bank of England, personally unknown to me, with a large grown-up family, and who resided at No. 7 for fourteen years, prior to the sad visitation to this terrace, and who since then has purchased No. 5, where he now lives, I might have supposed there was danger to our future healths if this ditch were left undisturbed. The only risk we can run is, if at this autumn season of the year, and before the frost and cold weather could set in, they are permitted to disturb and spread over the meadows the filth that must exist at the bottom of this ditch, residence where yellow fever and plague visited, induces this my belief, and may cause to us in Albion-terrace bad smells and a second visitation, and also into those streets at right angles with us, but more contiguous to this "Black Ditch," and where before there was not the least symptom of cholera. If, therefore, the cleansing has commenced, it should be instantly stopped, and for the present autumn they need give only a good supply of clean water, and to flow over the surface.

Dr. Milroy, who was sent by the Government at the last visitation, could assure your Lordship that it was from a heavy fall of rain; a choked-up barrel road-drain, which ought now to be looked at; our cesspools close to our houses; the back-water running over the spring, and mixing our fine pump-water and cesspool filth together; that the disease was confined to Albion-terrace, and also solely to those who used this water; and that persons living 200 yards nearer to the ditch than we are never had the least illness.

Dr. Milroy might also state to the Commissioners of Sewers, that the drainage of houses, built on 30 to 60 feet higher ground, ought not any longer to go into this ditch, but be turned, and easily so, into the high-road drains. This "Black

Correspondence, &c.

Ditch" might then be closed, allowed to dry up, and save the Commissioners a useless disburse of 10,000 *l.* for solely 100 small houses.

For the guidance of your Lordship and the Commissioners, I will state, that a few months back a petition was taken round by two of the petty builders of our locality for this ditch to be bricked over. This done as desired, then the meadows would be let on building leases for new streets running to the new iron bridge from Chelsea; several thousand pounds would have been gained by this building speculation, which cannot be carried out unless the Commissioners make the drains, and thus prepare the ground for building operations. It was also stated, that the tithes on the small house gardens, which the rector of Clapham claims and takes from me and others, also the doubled church rates, would then be increased to him nearly threefold.

Your Lordship will readily believe, that where nearly ten collectors live by the per-centages, &c. &c., on these collections, that they are always fully alive to aught that will augment their remuneration.

Within the last fortnight, a petition has again been going round for the above purpose; and I suppose that at this time, having secured assistance from the timorous, greater success must be hoped for than attended the former attempt.

Your Lordship may not deem it improper that the graveyards of the Clapham old church, also of that on the Common, should not longer be used; for they are in the midst of dense populations, and but following out what is done in other countries during disease. Ought not the congregation of persons in heated and fetid atmospheres to be prohibited for a time, and after November all the churches could then be opened with safety?

I have, &c.
(signed) *J. W. Dover.*

3d October.— I am this instant told that persons are already employed spreading over the field the stuff from the ditch.

No. 51.

The Honourable *H. Fitzroy* to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 1 October 1853.

29 Sept. 1853.

I AM directed by Viscount Palmerston to transmit to you, for your report thereon, the enclosed copy of a letter from Mr. George Cooke, of No. 5, Kendal-place, Kennington, calling attention to the state of an open ditch on the east side of Kennington Common.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 51.

My Lord, 5, Kendal-street, Kennington, 29 September 1853.

IN your most able and practical reply to the address of the town council of Perth, you stated, " that you were willing to hear the opinion of such as you, and although there might be a great deal of chaff, it would be worth winnowing if you could turn the pint of corn to a good purpose."

Thus encouraged, I venture to address your Lordship in your capacity of Home Secretary.

To the east of, and close upon, Kennington Common, in the midst of a densely populated neighbourhood, there is a large open ditch that receives the soil from several privies, as also any refuse matter, animal and vegetable, that may be thrown into it. There is scarcely any fall or outlet from this ditch, the position of it being very low, and nearly on a level with the river, consequently decomposition soon takes place and infects the atmosphere.

A word from your Lordship in the proper quarter would soon rid us of so vile a nuisance, and I, therefore, trust that ere long, we shall begin to think that the Commissioners of Metropolitan Sewers are really working some good.

I have, &c.
The Honourable Viscount Palmerston. (signed) *George Cooke.*

No. 52.

No. 52.

The Honourable *H. Fitzroy*, M. P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 4 October 1853.

I AM directed by Viscount Palmerston to request that you will inform his Lordship whether any sewers discharge themselves into the piece of water in St. James's Park; and if so, whether those sewers could not be diverted to some other outlet.

I am, &c.
(signed) *Henry Fitzroy.*

No. 53.

The Honourable *H. Fitzroy*, M. P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 4 October 1853.

I AM directed by Viscount Palmerston to transmit to you, for your report thereon, the enclosed copy of a letter from the vestry clerk of St. Saviour's, Southwark, relative to the state of the sewers in that parish. September 29.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 53.

8, Wellington-street, London-bridge,
29 September 1853.

My Lord,

I AM directed to apprise your Lordship that, by a resolution of a most numerously assembled vestry of the parish of St. Saviour's, Southwark, held this day, was unanimously resolved, that a representation should be made to your Lordship of the existence of a large main sewer emptying itself into St. Mary Overy's Dock, and of other similar sewers in different parts of Bankside.

The officers of the parish have received most urgent complaints of the danger arising from the noxious vapours and effluvia which escape from the mouths of these several sewers, for it must be borne in mind that every description of filth is conveyed into these sewers from all parts of the southern side of the metropolis, and then immediately debouching themselves into the river, at the land side of the river, cannot but be most offensive, detrimental, and, indeed, dangerous; so much so as to prevent the inhabitants of the houses on and near to the bank of the river from opening their windows.

The officers, while admitting and most earnestly desiring to remedy the evil, feel their inability to do so, as it is thought that the Commissioners of Sewers are the body who ought to deal with the nuisance; but it appearing that they are at present without means, and it being absolutely necessary that immediate and energetic remedies should be applied to remove the nuisances, so as to prevent the spread of the alarming epidemic, the cholera, which has again made its appearance in England, the vestry have determined to apply to your Lordship, believing that your Lordship can have sufficient remedies immediately adopted.

It has been thought that, if the mouths of the sewers were continued by pipes or other means into the centre of the Thames, beneath the tide at low-water mark, the evils might be remedied; but this the vestry do not presume to dictate to your Lordship. All they wish is, that the matter should be fully represented to your Lordship, not doubting of your Lordship having such steps taken as will abate the nuisance, and thus remove all fear.

I have, &c.
(signed) *J. Herbert Sturmey,*
Vestry Clerk.

The Honourable Viscount Palmerston.

No. 54.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M. P.

Sir, 1, Greek-street, Soho, 5 October 1853.

WITH reference to your letter of the 1st instant to the Metropolitan Commissioners of Sewers, transmitting a copy of a letter from Mr. George Cooke, of No. 5, Kendal-place, Kennington, to Viscount Palmerston, respecting an open ditch on the east side of Kennington Common, I have the honour to report, for his

Correspondence, &c.

his Lordship's information, that the Commissioners are now constructing a brick-covered sewer in the locality in question, by which they will be able to abolish the open ditch for a length of 2,000 feet. It is expected that the work will be completed between the present time and Christmas.

I have, &c.
(signed) *Richard Jebb.*

No. 55.

The Honourable *H. Fitzroy*, M.P., to the Commissioners of Sewers.

(Pressing.)

Gentlemen, Whitehall, 6 October 1853.

October 1.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a letter from the clerk to the Guardians of St. Saviour's Union, calling attention to the state of the sewers emptying themselves into the Thames within the parishes which constitute that Union.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 55.

SAINT SAVIOUR'S UNION.

My Lord, 79, Blackfriars-road, 1 October 1853.

AT a meeting of the Sanitary Committee of this Union, consisting of the whole of the Guardians and the Churchwardens of the parishes which constitute the St. Saviour's Union, held on Friday evening, 30th ultimo,

It was resolved,—

"That the Secretary of State for the Home Department be written to, calling his attention to the general state of the sewers emptying into the Thames within this district, and requesting his interference with the Sewers Commission to abate the dangerous nuisances occasioned by them."

I am directed by the Committee to represent to your Lordship, in the strongest manner, the necessity for immediate measures for the abatement or removal of these nuisances.

Your Lordship will remember, that in the year 1849 this district was visited by cholera almost as severely as any in the Metropolis, and it was then considered that the severity of this frightful disease was attributable in a great measure to the imperfect state of the common sewers, which have not been improved since that period.

The sanitary committee sit three times a week, at great personal inconvenience, and are adopting vigorous measures for the suppression of nuisances under their jurisdiction; but all these efforts must prove unavailing, while the dangerous nuisances to which I have called your Lordship's attention remain unnoticed.

The Committee, therefore, trust your Lordship will as speedily as possible direct some means for remedying these most fruitful sources of disease in the neighbourhood.

I am, &c.
(signed) *James Blake,*
Clerk to the Guardians.

Right Honourable Viscount Palmerston.

No. 56.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 7 October 1853.

I HAVE the honour to acknowledge the receipt of your letter of yesterday, addressed to the Metropolitan Commissioners of Sewers, transmitting by direction of Viscount Palmerston a copy of a letter from the clerk to the Guardians of St. Saviour's Union, and to acquaint you that both letters shall be laid before the Commissioners at their next meeting, on Tuesday next.

I am, &c.
(signed) *Richard Jebb.*

No. 57.

Correspondence, &c.

The Honourable *H. Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 7 October 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed extract of a letter from Mr. Tyrwhitt, one of the magistrates of the Clerkenwell Police Court, representing the defective state of the drains which pass under the court. October 4.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 57.

EXTRACT from Letter of Mr. *Tyrwhitt*, dated Clerkenwell Police Court, 4 October 1853.

I HAVE now to mention that I find the great sewer of the Fleet Ditch or River passes along the street close to this point, and that the large drain, which carries the contents of about six smaller ones from the cells, &c. of this front house to that Fleet Ditch, passes under the court itself, and the private rooms in its way thither.

The consequence is, that in many states of the weather, and particularly at high tides, the matters flowing from these drains are backed up the Fleet Ditch, and thence up the drains by the tide, and occasions the offensive smell, so disgusting to those who have the misfortune to attend this court on business, often in crowds, as well as to the residents in the house.

This is so dangerous at this moment, that it is hoped the drains, &c. may be immediately attended to by competent persons, under the orders of the Right Honourable Secretary of State.

No. 58.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 8 October 1853.

I HAVE to acknowledge the receipt of your letter of the 7th instant, addressed to the Metropolitan Commissioners of Sewers, transmitting an extract of a letter from Mr. Tyrwhitt, representing the defective state of the drains which pass under the Clerkenwell Police Court. And I beg to say, for the information of Viscount Palmerston, that the premises shall be inspected with a view to a remedy, if practicable.

I have, &c.
(signed) *Richard Jebb.*

No. 59.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 8 October 1853.

IN reply to your letter of the 4th instant, addressed to the Metropolitan Commissioners of Sewers, I beg to state, for the information of Viscount Palmerston, that no sewers discharge themselves into the piece of water in St. James's Park except those which serve for the surface drainage of the park itself. The report of Mr. Cooper, engineer of the district, herewith transmitted, and the plan accompanying it, exhibit the state of the drainage of that locality. Copy of Mr. Cooper's Report on piece of water in St. James's Park.

I am, &c.
(signed) *Richard Jebb.*

Enclosure with No. 59.

WESTERN DIVISION OF WESTMINSTER.

LETTER hereto attached, signed *Henry Fitzroy*, asking, at the request of Lord *Palmerston*, whether any sewers discharge themselves into the piece of water in Saint James's Park, and if so, whether such sewers could not be diverted to some other outlet.

Metropolitan Commissioners of Sewers,
1, Greek-street, Soho, 8 October 1853.

I BEG to report, with reference to this inquiry, that I have made a careful survey of the park and its waters, and find that the only sewer which has an opening connected with it, is

Correspondence, &c.

is at the east end, and is so brought up as to take the overflow water from the reservoir. There are three penstocks along the line of this sewer, one in the enclosure itself, which is attended to, and worked by the park gardener whenever it is required to lower the water in the reservoir. At all other times it is kept down, and the water in the park, when above the level of its top, is allowed to flow over it; so the back water in the sewer, whenever it rises to this height, finds its way into the water of the reservoir.

The other two penstocks are situate outside the enclosure, as shown on the accompanying Plan, and are under the control of the Board of Works.

This line of sewer has never been taken to by this Commission; it has always been kept in repair, and cleansed from time to time by the above Board, and is known as the Admiralty Sewer.

The two last-mentioned penstocks I have since examined, and found them to be in any thing but a perfect state, more especially the one nearest the enclosure.

It will be perceived by the accompanying section, that the line of sewer referred to, is in a very bad state, and forms complete cesspools in places, from the irregular level of its invert.

I may state, that the surface drainage of the walks, of nearly the whole of the enclosure, finds its way by means of iron and other pipes into the ornamental water.

If these penstocks were kept in a perfect state, no sewage water could ever find its way into the reservoir, but this even now can only occur in cases of heavy falls of rain, and large accumulations of back water at high tides.

(signed) *Edmd Cooper*, Engineer.

No. 60.

Richard Jebb, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 8 October 1853.

With reference to your letter of the 13th September, addressed to the Metropolitan Commissioners of Sewers, transmitting a letter of Mr. John Brown, of 281, High-street, Poplar, herewith returned, I beg to report, for the information of Viscount Palmerston, that the nuisance complained of by that gentleman has been ascertained to arise from a discharge of gas-refuse into a sewer of the Commissioners. The same nuisance forms the subject of several complaints from other inhabitants of the same locality, and, amongst them, from Mr. D. Dunbar, a copy of whose complaint, addressed to Viscount Palmerston, was forwarded to this office, accompanied by a letter from you of the 2d ultimo. The Commissioners have experienced considerable difficulty in obtaining precise evidence of a nature enabling them to act; but having at length traced the nuisance to two gas companies, they have served peremptory orders upon those companies to abate the nuisance, which it is expected will be effectual.

I am, &c.
(signed) *Richard Jebb.*

No. 61.

The Honourable *H. Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 10 October 1853.

I am directed by Viscount Palmerston to transmit to you, for your report thereon, the enclosed memorial of certain ratepayers residing in the Camberwell New-road, complaining of the defective drainage of that neighbourhood.

Oct. 1853.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 61.

(Copy.)

To the Right Honourable Lord Viscount *Palmerston*, Her Majesty's Secretary of State for the Home Department.

We, the undersigned owners and occupiers, being ratepayers, residing in the Camberwell New-road, partly in the parish of St. Mark's, Kennington, and partly in the adjoining parish of St. Giles, Camberwell, do humbly and respectfully implore your Lordship to take into consideration the grievances under which many of the inhabitants of the Camberwell New-road

road are now labouring from the effects of the unwholesome drainage in that neighbourhood, which is caused from the want of the construction of a proper sewer down a portion of the main road leading to the Green, and which has subjected your memorialists to not only considerable inconvenience, on account of the kitchens and cellars of their dwellings being under water, but has also put them to unnecessary expenses in fixing pumps to convey it into the public road, to the great annoyance of the Commissioners thereof, in addition to risking the healths of their families, who are, from compulsion, often left the unwilling inmates to inhale its impurities. Your memorialists, therefore, entreat your Lordship to consider the justness of their claims, which have on other occasions been set forth in similar memorials to the Commissioners of Sewers, but without effect, in order that your Lordship may see how unfairly the interests of your memorialists have been represented, particularly as other new property adjoining (called the Holland Estate, belonging to Lord John Russell) has been fully and completely drained; whereas that for which your memorialists are now seeking redress has not only paid sewers' rates, for more than 20 years, without either the benefit of a sewer, or even a prospect of relief, but remains entirely at the mercy of a most inefficient Commission, who do not expend the amount of the rates collected in the respective parishes, where such rates are supposed to be levied for the purpose of their exclusive drainage.

Correspondence, &c.

(signed) *C. J. Martyn*, Owner,
and 57 others.

7, County Terrace.

No. 62.

The Honourable *H. Fitzroy*, M. P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 10 October 1853.

I AM directed by Viscount Palmerston to request that you will inform his Lordship, at your early convenience, what steps are being taken in regard to the drainage of the parish of St. Mary, Rotherhithe.

I am, &c.
(signed) *Henry Fitzroy.*

No. 63.

The Honourable *H. Fitzroy*, M. P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 11 October 1853.

I AM directed by Viscount Palmerston to transmit for your information a letter from the clerk to the Guardians of the St. Saviour's Union, forwarding extracts from the report of the inspector of nuisances for that Union, relative to the state of the sewerage of that district. 6 October 1853.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 63.

(8772.)

SAINT SAVIOUR'S UNION.

79, Blackfriars-road, Southwark,
6 October 1853.

My Lord,

I AM directed by the sanitary committee appointed for this union to forward, for your perusal, the accompanying extracts from the Report of the inspector of nuisances, under date the 4th of October instant.

The places mentioned in these extracts are not the only instances of the imperfect state of the sewerage, but are merely indicative of the general condition of the union, which calls for your Lordship's immediate interference with those who have power to remedy the evil.

I am, &c.,
(signed) *James J. Blake*,
Clerk to the Guardians.

To the Right Hon. Viscount Palmerston,
Her Majesty's Principal Secretary of State
for the Home Department.

Correspondence, &c.

Further Enclosure with No. 63.

Extracts from the Report of the Inspector of Nuisances for the *St. Saviour's* Union, dated 4 October 1853.

"I examined the ditch complained of by the Rev. W. Curling; it is near the Infant School, Victoria-place, in St. Saviour's parish. It is a common sewer, uncovered, and a number of drains run into it from the houses near. You may see the ditch from the back of Mr. Carlew's house in Victoria-place, Union-street; the effluvia and stench arising therefrom must be a very great nuisance, and very injurious to the health of persons living near to it. I visited one room in the school, and the smell was there very offensive; it is close to the ditch. The mistress of the school stated that several of the children had been ill in consequence of the smell. Mr. Townson, inspector of police, who lives in the court, and next door to the school, says the stench is so great in his back room at times, that he is obliged, with his family, to remove into the front room, and that he shall be obliged to leave in consequence.

"At Waterloo-buildings, Ewer-street, St. Saviour's, the privies (two) are in a most filthy and unwholesome condition, and must be very injurious to the health of persons living in that place. There appears to be a very great scarcity of water; only one small pipe for the whole court, containing ten houses, and the water is on only for a short time. There are not sufficient privies in the place."

"In Red Lion-court, Ewer-street, there is only one privy to supply five houses, and this is in a most filthy state; they are also very short of water."

No. 64.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M. P.

Sir, 1, Greek-street, Soho, 12 October 1853.

I have to acknowledge the receipt of your letter of the 10th instant, addressed to the Metropolitan Commissioners of Sewers, requesting them to inform Viscount Palmerston what steps are being taken in regard to the drainage of the parish of St. Mary, Rotherhithe, and I beg to state, for his Lordship's information, that on 10th ultimo a contract was entered into for the construction of drainage works extending nearly a mile in length in Rotherhithe-street and Queen-street, Rotherhithe, to the amount of 6,900*l.*; that, before commencing the works, the contractor has been obliged to wait for the manufacture of certain iron work for the outlet under the river bank to low-water mark, which, however, is now nearly ready; and that it is expected he will break ground to-morrow. By his contract he is bound to use all reasonable expedition in carrying on and completing the works, a stipulation which the Commissioners will duly enforce.

I have, &c.
(signed) *Richard Jebb.*

No. 65.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M. P.

Sir, 1, Greek-street, Soho, 12 October 1853.

I beg to acknowledge the receipt of your letter of the 11th instant, addressed to the Metropolitan Commissioners of Sewers, transmitting, by direction of Viscount Palmerston, a letter from the clerk to the Guardians of the St. Saviour's Union, with extracts from the report of the inspector of nuisances for that union, relative to the state of the sewerage of that district, and to inform you that the subject will receive attention.

I have, &c.
(signed) *Richard Jebb.*

No. 65. A.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M. P.

Sir, 1, Greek-street, Soho, 12 October 1853.

I have to acknowledge the receipt of your letter of the 10th instant, addressed to the Metropolitan Commissioners of Sewers, and transmitting, for their report, a memorial (herewith returned) of certain ratepayers residing in Camberwell New Road, complaining of the defective drainage of that neighbourhood.

On

On the part of the Commissioners I beg to report that in May last a similar representation respecting the drainage of the same locality was made to his Lordship by Mr. John Matson, and forwarded to me for a report, and that my report thereon, dated 5th May, and addressed to Mr. Waddington (of which I transmit a copy) applies equally to the present memorial.

With respect to the allegation in the memorial relating to the drainage of the Holland Estate, upon reference to the records of this office it appears that under former commissions, in 1849 and 1850, numerous and urgent complaints of the prevalence of cholera and other diseases, attributed to the defective state of the drainage of the neighbourhood, were preferred to the Commissioners by the inhabitants of that estate, and that upon the report of the district surveyor, dated 21st May 1851, the Court ordered a sewer to be built in the Loughborough-road traversing the Holland Estate, which sewer was shortly afterwards constructed, at a cost to the district of 848 *l.* 5*s.* 4*d.* Its immediate construction was not, as in the present case, impeded by any engineering difficulty, inasmuch as there existed an outfall at a proper depth.

I am, &c.
(signed) *Richard Jebb.*

No. 66.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M. P.

My Lord, 1, Greek-street, Soho, 12 October 1853.

I HAVE the honour to transmit to your Lordship copies of the reports of Sir William Cubitt and Mr. Stephenson, consulting engineers to the Metropolitan Commission of Sewers; also a copy of the report of the acting engineer, Mr. Bazalgette, upon the proposed northern high level intercepting sewer for London, together with a map exhibiting the course of the sewer and the district which it will drain.*

Those gentlemen are now actively engaged in preparing their reports upon the main drainage of the districts south of the Thames, which, it is expected, will be ready in about a week; when they are presented to the Commissioners, copies shall be immediately forwarded to your Lordship.

I have, &c.
(signed) *Richard Jebb.*

No. 67.

The Honourable *H. Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 12 October 1853.

I AM directed by Viscount Palmerston to request that you will inform his Lordship what progress you have made in your arrangements for executing the drainage works, for which the Act of last Session gave you power to raise the money required. I am at the same time to observe that it is now two months since that Act passed, and cholera is gradually establishing itself in the metropolis.

I am, &c.
(signed) *Henry Fitzroy.*

No. 68.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 13 October 1853.

WITH reference to your communication of the 4th instant, addressed to the Metropolitan Commissioners of Sewers, transmitting for their report a copy of a letter from the vestry clerk of St. Saviour's, Southwark, relative to the state of the sewers in that parish, on the part of the Commissioners, I have to report, for the

* The documents referred to were presented to Parliament in March 1854, and subsequently printed by order of the House of Commons (No. 84, Sess. 1854).

Correspondence, &c.

the information of Viscount Palmerston, that the letter in question urges upon his Lordship the expediency of carrying out a very costly work; namely, the continuation of the mouths of the existing sewers on the south side of the Thames by pipes into the centre of the river, beneath low-water mark. This work, however desirable, is altogether beyond the means at present at the disposal of the Commissioners, of which circumstance the officers of the parish of St. Saviour's appear to be aware.

Upon this subject I beg to enclose a copy of a report of Mr. Bazalgette, engineer to this Commission.

I am, &c.
(signed) *Richard Jebb.*

Enclosure with No. 68.

J. W. Bazalgette, Esq., to the Commissioners of Sewers.

(Copy.)

Extending the Mouths of the Sewers below Low-water Mark in the River Thames.

Gentlemen, 7 October 1853.

With reference to the letter on this subject addressed to Viscount Palmerston by the vestry clerk of St. Saviour's, Southwark, I beg to report, that I fully concur in the views expressed by Mr. Robert Stephenson and Mr. Haywood, the engineer to the City Commissioners of Sewers, before the Committee on the Great London Drainage Bill, viz., that it is desirable, under any circumstances, to extend the mouths of the sewers below low-water mark; the benefit would be felt more immediately than can be expected from the execution of the main drainage works.

The cost of this work cannot, under any circumstances, be estimated at less than 100,000 *l.*; perhaps it would exceed that amount, and the funds of the Commissioners would not enable them at present even to commence it.

I have, &c.
To the Metropolitan Commissioners of Sewers. (signed) *J. W. Bazalgette.*

No. 69.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 13 October 1853.

On the part of the Metropolitan Commissioners of Sewers, I beg to acknowledge your letter of yesterday, requesting the Commissioners to inform Viscount Palmerston what progress they have made in their arrangements for executing the drainage works, for which the Act of last Session gave them power to raise the money required.

In reply, I beg to state that my letter of yesterday to his Lordship shows that the plan of the Northern High Level Intercepting Line is complete, and I may add that the Commissioners will be in a situation to enter into contracts for the execution of a considerable portion of that line, within ten days after they shall be assured that the necessary sums will be in their hands to meet the demands of the contractors at the regular periods.

As regards the drainage south of the Thames, the Commissioners expect to receive on Tuesday next the final recommendation of their engineers (one of whom only returned from Canada eight days ago), after which they will be equally prepared to enter into contracts for a portion of that drainage.

I have, however, to request that you will be good enough to call his Lordship's attention to the result which has hitherto attended the exertions of the Commissioners to obtain the necessary funds. They have applied to several of the chief insurance offices, viz., the Royal Exchange, the Provident, the Economic, the Globe, the Mutual, the London Assurance, and the Amicable, in order to effect a loan on the security of the sewers rates; but those bodies have severally intimated that they are not disposed to entertain the application, several of them, as it is conceived, being actuated by the present condition of the money market. The Exchequer Loan Commissioners have likewise been applied to, and have also declined. A communication has taken place with a view to ascertain whether the

Bank

Bank of England will be willing to advance the money, but there is reason to believe that a formal application in that quarter will not be successful.

It is necessary to observe that the modifications and extension by the engineers of the designs for the two main works have largely increased the estimates for those works, and must materially affect the determination of the Commissioners in the selection of any other extensive works beyond those now in progress, to which current rates are to be applied; and no final decision can be come to upon the latter until the Commissioners know whether or not they can at the present time enter upon the execution of the main works.

I beg to add, that before any decisive steps can be taken in this matter, it is requisite that the Commissioners should have the certainty of being able punctually to fulfil the engagements into which they may enter, having on a former occasion experienced great embarrassment from the sudden reduction of their funds.

I am, &c.
(signed) *Richard Jebb.*

No. 70.

The Honourable *H. Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 14 October 1853.

I AM directed by Viscount Palmerston to forward to you the under-mentioned representations, which have been received, relating to the sewerage and drainage of the Metropolis; viz.—

Letter from Mr. W. Constable, of Union-terrace, Royal-crescent, Notting-hill, of the 10th instant.

Letter from Mr. H. Ketterman, of 174, Church-street, Shoreditch, of 10th instant.

Memorial of the Western Medical and Surgical Society, of 11th instant.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure, No. 1, with No. 70.

6, Union-terrace, Royal Crescent, Notting-hill,
10 October 1853.

My Lord,

HAVING seen your Lordship's generous offer of accessibility as to all matters pertaining to the health of the people, am induced to submit to your Lordship the following case, relative to the sewerage of this locality. *Sic.*

A vast district of building operations are now going on, known as the "Kensington-park Estate," and which is situate at the top of a steep hill, the sewerage of which is conveyed to the lower ground, known as the "Norland Estate;" so that at times of heavy rain, should that happen at high water, the filth and effluvia of the sewers above is driven into the houses below, to the great damage of property and risk of health. Such is the case at this time, and likewise three or four times about twelve months since.

I must also inform your Lordship that the Kensington-park Estate is a new district, and only within a few years attempted to be drained by the same sewer as the Norland, and which cannot possibly convey the rush of water from the hills at the time before stated.

I am, &c.
(signed) *Wm. Constable.*

Enclosure, No. 2, with No. 70.

174, Church-street, Shoreditch, 10 September 1853.

To the Right Honourable Lord *Palmerston*, Her Majesty's Principal Secretary of State.

The humble MEMORIAL of *Henry Ketteman*;

Showeth,

THAT your memorialist is a pork butcher, doing a large business; and that I am painfully situated for want of drainage; the little I had into the street is lately cut off.

My trade requires, imperatively, on my part great cleanliness; consequently, much water, and a proper channel to carry off all offensive matter, particularly as the cholera is making rapid progress. I beg leave to state there is no sewer in Church-street, a great leading

Correspondence, &c.

thoroughfare, and yet I pay sewers rates, and a sewer is being constructed to only a part of the street, leaving the largest part without any at all. Your memorialist prays that your Lordship may order that inquiry into this case that health, in a sanitary sense, so very urgently requires. I address this to your Lordship, well knowing your zeal for the public health.

Your Memorialist will humbly pray.

Enclosure, No. 3, with No. 70.

To the Right Honourable Viscount *Palmerston*, Secretary of State for the Home Department.

The MEMORIAL of the Western Medical and Surgical Society.

My Lord,

THE cholera having for the third time arrived in England, and from the violence of its onset having excited considerable alarm among the population, the Western Medical and Surgical Society considered it to be their duty to summon a special meeting upon the subject, which was held on Friday evening, October 7th, 1853; James Arthur Wilson, Esq., M. D., in the chair.

At this meeting, after various nuisances calculated to produce atmospheric impurity had been alluded to, the open part of the Ranelagh sewer, extending from the King's-road, Chelsea, to the river Thames, was considered to be the most likely one to occasion a noxious influence, should the cholera attack the inhabitants residing in its vicinity.

During the last invasion of cholera, numerous persons living in streets contiguous to the Ranelagh sewer fell victims to the disease, and more recently a poor woman who resided in a house adjoining the sewer died from puerperal fever, which often originates in an impure atmosphere, and which in this instance caused the death of the patient; her physician, the late Dr. Manson, and the nurse, another nurse also, was confined for some time to bed with fever.

In addition to these facts, it is well known by medical men acquainted with the locality, that disease of a dangerous character is constantly occurring on its banks; hence it has become the focus for cholera and other epidemic complaints. Various efforts have been made with a view to remove the nuisance, but without effect.

The members of the Western Medical and Surgical Society having felt a deep interest in, and having watched the progress of, the cholera which raged so fearfully in 1848–9, have felt most anxious to remedy or prevent the crying evils attendant upon the agency of a tainted atmosphere, and are confident that they will not be deemed importunate in bringing before the immediate notice of the Government a matter of so much public importance.

Signed on behalf of the Society by

James Arthur Wilson,
President of the Western Medical and Surgical Society,
Senior Physician to St. George's Hospital.

The Right Honourable
Viscount Palmerston.

Communicated by C. J. B. Aldis, M. D., Vice-President of the Western Medical and Surgical Society, 1, Chester-terrace, Chester-square, 11th October 1853.

No. 71.

E. H. Woolrych, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 17 October 1853.

I BEG to acknowledge the receipt of your letter of the 14th instant, forwarding, by direction of Viscount Palmerston, the under-mentioned letters and memorial, relative to the sewerage and drainage of the Metropolis; viz.—

A letter from Mr. W. Constable, of Union-terrace, Notting-hill.
A letter from Mr. H. Ketterman, of 174, Church-street, Shoreditch.
A memorial of the Western Medical and Surgical Society, dated 11th instant.

And to state that those communications shall be laid before the Commissioners at their next meeting.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 72.

No. 72.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M.P.

My Lord, 1, Greek-street, Soho, 18 October 1853.

I HAVE the honour to transmit to your Lordship copies of the reports of Mr. Bazalgette, engineer to the Metropolitan Commissioners of Sewers, and of Sir William Cubitt and Mr. Stephenson, the consulting engineers, upon the main drainage of the districts south of the Thames, with a map showing the drainage areas and courses of the proposed sewers.*

I have, &c.
(signed) *Richard Jebb.*

No. 73.

The Honourable *H. Fitzroy*, M.P., to *Richard Jebb*, Esq.

Sir, Whitehall, 19 October 1853.

I HAVE laid your letter of the 13th instant before Viscount Palmerston, and I am to observe, with reference to the difficulty which you state, the Metropolitan Commissioners of Sewers have experienced in obtaining funds, that the Act of last Session provides for the permanent payment of the interest and sinking fund of any loan to be raised by them, notwithstanding any possible extinction of the Commission before the extinction of their debt.

Lord Palmerston would like to see the plan and estimate referred to in your letter, and he requests to be informed why the estimate has been increased, and what size and shape of sewer it is proposed to construct.

I am, &c.
(signed) *Henry Fitzroy.*

No. 74.

The Honourable *Henry Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 19 October 1853.

I AM directed by Viscount Palmerston to transmit for your consideration the enclosed representation of the Guardians of the Greenwich Union, in reference to the want of drainage in parts of that union.

Received 17 Oct. 1853.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 74.

To the Right Honourable Viscount *Palmerston*, Her Majesty's Secretary of State for the Home Department.

WE, the Guardians of the Greenwich Union, having recently received the directions and regulations of the General Board of Health, issued under the Nuisances Removal and Diseases Prevention Act, wherein is cast upon us the responsibility of seeing that the said directions and regulations are duly carried out within our jurisdiction, deem this the most proper time to address your Lordship, as Secretary of State for the Home Department, upon the want of sewerage in most parts of this union, and upon the entire want in every part thereof of a constant and abundant supply of pure water, both of which are so essential for sanitary purposes. It is in vain, your Lordship, for the Legislature to pass acts with penal clauses, visiting with pains and penalties the unfortunate owners and occupiers of property, who, in numberless instances, are wholly unable to keep themselves, while the Government neglects this paramount duty in enforcing an efficient system of drainage, and in insisting upon a constant and an abundant supply of pure water. There are thousands of houses in this union that have no other receptacles for the refuse of their water-closets than holes dug in the earth immediately contiguous to the living and sleeping-rooms of their inhabitants, and into which, for the want of proper drainage, the waste water and other refuse of the houses are hourly thrown, thus constantly stirring up their foul contents, and saturating the earth for yards around, and in many instances penetrating into their cellars, from which fœtid

* *See* Note to No. 66.

Correspondence, &c.

fœtid effluvia are continually arising, poisoning the air, and spreading disease and death in every direction. Need we wonder, then, your Lordship, that when any epidemic visits us, the poorer and badly-drained localities in our union suffer the most. Typhus is constantly with us, and cholera, in each of its visits, has cut off hundreds of our population, and burdened our poor-rates for years after it has passed away with thousands of pounds for the support of the families of its victims. What, your Lordship, would be the cost of these most sanitary measures above referred to, when compared with the suffering, distress and destitution these malignant, and, we believe, in a great measure preventible, diseases occasion?

For many centuries the foot of no foreign foe has fallen upon our shores, yet if there be but the shadow of a shade of suspicion that an invasion is contemplated, what millions are expended in reinforcing our army and navy, in strengthening our defences, and in preparing the munitions of war to meet the invader, although perchance the rumour of invasion be but a dream; yet thrice within a quarter of a century has cholera invaded our land, mowing down its thousands with ruthless hand, and although we have watched its approaching footsteps, it finds us on this its third visitation still unprepared, and its power, in consequence, is sevenfold more terrible than before, while typhus, our old deadly domestic enemy, insidiously preys upon our population undisturbed.

We deeply feel our responsibility at this juncture, your Lordship, and in conjunction with the local boards in our union, we pledge ourselves to do all in our power to carry out the "orders" of the General Board of Health; but we know too well how comparatively inefficient will be all we can do, while the greater part of this union is wholly without any sewerage whatever.

We, therefore, earnestly pray your Lordship to at once apply your vigorous mind to accomplish a complete system of sewerage around the metropolis generally, and to such parts of this union as need it in particular.

We believe that the Board of Commissioners of Metropolitan Sewers, as at present constituted, and with their limited powers, never can carry out this desirable object. For years have they levied rates amounting to many thousands of pounds in the town of Deptford in this union, while they have not expended as many hundreds there as they have taken thousands from the inhabitants; and yet that town and also many parts of Greenwich need sewerage more than any other district, on account of the density and poverty of their population. The excuse of the Commissioners, when applied to upon the subject is, that the money is needed elsewhere.

Believing, your Lordship, that the longer the complete sewerage of the suburbs of the metropolis is delayed, the more imperative, difficult and costly it will become, on account of the rapid growth and spread of its population, we again press upon your Lordship's consideration these important subjects. No reasonable present cost should be weighed for a moment against the present and future evils and consequences, the want of efficient sewerage and drainage and an abundant and constant supply of pure water engenders.

Feeling assured that the grave importance of these subjects will be considered by your Lordship as a sufficient apology for our troubling you on this occasion, with profound respect,

We are, &c.
Signed on behalf of the Guardians of the Greenwich Union,
(signed) *B. Carter*, Chairman.

No. 75.

The Honourable *Henry Fitzroy* to the Commissioners of Sewers.

Gentlemen, Whitehall, 20 October 1853.

I AM directed by Viscount Palmerston to transmit herewith, for your consideration, a memorial from owners and occupiers of part of the Norland Estate, on the subject of the drainage of that locality.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 75.

To the Right honourable Lord Viscount *Palmerston*, Her Majesty's Principal Secretary of State for the Home Department.

The humble MEMORIAL of the Owners and Occupiers of part of the Norland Estate, in the Parish of St. Mary Abbotts, Kensington, and of Shepherd's Bush, in the adjoining Parish of Hammersmith, both in the County of Middlesex;

Sheweth,

THAT your memorialists, aware of the many claims upon your Lordship's attention, approach you with considerable regret, to lay before your Lordship a statement of facts relating to the drainage of this locality.

That

That your memorialists' property and houses are of a superior character, situate about one mile from Bayswater, running parallel with Lord Holland's park and estate, and paying very largely towards the parochial and other rates and taxes. That these houses were, in consequence of the heavy fall of rain on Saturday last, flooded for some considerable time, and at a depth varying from one to four feet. Your memorialists, having carefully examined into the subject, are in a position to prove that the main cause of this inundation is, that the drains of the Kensington-park Estate, which stands at the top of Notting-hill, adjoining the Norland Estate, have been allowed by the Commissioners of Sewers to enter those of the said Norland Estate. Until the last year, the sewers were found ample for this locality, but in consequence of the mass of buildings which have been recently erected at Notting-hill, on the said Kensington-park Estate, the rain, which heretofore was absorbed in the ground, now finds its way into the sewers, and which are insufficient to carry off such a body of water from the hill.

That your memorialists wish, most earnestly, to impress upon your Lordship, that unless some effectual remedy is speedily adopted, this evil will go on increasing in proportion with the number of houses erected in the neighbourhood, and that the houses in the lower districts will be subject to increased inundations.

That your memorialists, in December last, applied to the Commissioners of Sewers, in consequence of the then floodings, for their assistance in the matter, and the Commission of Sewers having promised that the subject should receive their most earnest consideration, your memorialists were led to believe, more particularly as the season had been unexampled for rain, that the grievances of which they complained would be speedily remedied.

That your memorialists deem it unnecessary to enter at any length into the losses which a neighbourhood so circumstanced must suffer; to the owners, from the destruction of their property and loss of tenants; to the occupiers, from damage to their furniture and expense of removal; to the tradesman, from the damage to his stock and inconvenience in business. But at a time when the cholera is making such rapid strides in the country, and which threatens in its visitation to be more severe than in 1849, your memorialists feel it a duty they owe to your Lordship, no less than to themselves, to draw your Lordship's attention to the sickness which is likely to arise from such a state of things existing. A large mass of filth from the sewers is forced into the houses, bringing with it the noxious gases generated in the sewers, and which is calculated to produce cholera and other diseases of the most malignant kind.

Your memorialists, therefore, most earnestly pray that your Lordship will take the subject into your immediate consideration, and that you will be graciously pleased to permit a deputation to wait upon your Lordship, to enter more fully into the causes to which we have alluded, and to suggest such remedies which, we believe, if applied, would have the effect of removing the evils complained of.

And your memorialists will ever pray.

Signed on behalf of the meeting,
(signed) *Thomas Ridpath*, Chairman.

No. 76.

The Honourable *H. Fitzroy* to *Richard Jebb*, Esq.

Sir, Whitehall, 21 October 1853.

I AM directed by Viscount Palmerston to acknowledge the receipt of your letter of the 12th instant, forwarding copies of the engineers' reports upon the proposed Northern High Level Intercepting Sewer for London, and a map exhibiting the course of this sewer, and the district which it will drain. And I am to request that you will inform Lord Palmerston whether, upon reconsideration, the Commissioners of Sewers may not think that the diameter of portions of this great sewer might be diminished without impairing its draining capacity, and with some diminution of the expense of the work.

I am, &c.
(signed) *Henry Fitzroy*.

No. 77.

E. H. Woolrych, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 22 October 1853.

I BEG to acknowledge the receipt of your letter of the 19th instant, transmitting for the consideration of the Metropolitan Commissioners of Sewers a representation from the Guardians of the Greenwich Union relative to the drainage in parts of that union.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

Correspondence, &c.

No. 78.

E. H. Woolrych, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 22 October 1853.

I BEG to acknowledge the receipt of your letter of the 20th instant, transmitting, for the consideration of the Metropolitan Commissioners of Sewers, a memorial from owners and occupiers of part of the Norlands Estate, respecting the drainage of that locality.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 79.

Richard Jebb, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 22 October 1853.

I BEG to acknowledge your letter of the 19th instant. The difficulty which, as I stated in my letter of the 13th instant, the Metropolitan Commissioners of Sewers have hitherto experienced in obtaining funds, appears to be attributable, not to any doubt respecting the security which they are enabled to offer, but rather to the present state of the money market, which naturally deters capitalists from converting, at a heavy loss, their existing investments into money, for the purpose of lending it to the Commissioners. Yesterday, however, a communication was received from a large insurance company, of a nature which encourages the Commissioners to hope that the negotiation may terminate favourably.

I had the honour, on the 12th instant, of transmitting to Viscount Palmerston copies of the reports of the engineers upon the Hackney Brook or Northern High Level Intercepting Sewer, and on the 18th, of their reports upon the southern drainage; and I now beg to transmit, for his Lordship's use, a printed copy of those reports.* The maps intended to accompany them are not yet quite completed. I also transmit a copy of the detailed estimate for the Hackney Brook sewer, of which the aggregate only is given in the printed report of that work (p. 6), the Commissioners considering that the publication beforehand of the detailed estimate would not be prudent, until the contracts for all the works have been concluded.

In reply to his Lordship's inquiry respecting the size and shape of sewer proposed, I have to state, that the form is generally circular, with two exceptions, mentioned at pages 5 and 14 of the printed reports, and that the reports give the several sizes of the different portions of the sewers, the largest being $12\frac{1}{2}$ feet in diameter.

With respect to the information required by Viscount Palmerston, why the estimate has been increased, his Lordship will doubtless recollect that the estimates for new works presented to him in July last were at the time stated to be very rough, having been hastily prepared on short notice; and those which related to the main trunk lines were founded upon the estimates of the late Mr. Forster, which were applicable to sewers of much smaller dimensions. The engineers have suggested larger sewers, for reasons which are stated in the printed reports, especially at page 18. Moreover, the report on the drainage of the south side of the river embraces an additional line of sewer, which was fully contemplated at the time the original estimates were prepared, though not included in them, as being a work which it was not proposed to commence immediately. It must be added, that prices have materially advanced within the last two months, and are likely to be maintained at the present rates for some time to come.

I am, &c.
(signed) *Richard Jebb.*

No. 80.

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* *See* Note to No. 66.

No. 80.

Richard Jebb, Esq., to the Honourable *Henry Fitzroy*.

Sir, 1, Greek-street, Soho, 27 October 1853.

In reply to your letter of the 21st instant, I beg to state, for the information of Viscount Palmerston, that the Metropolitan Commissioners of Sewers having, in compliance with his Lordship's instructions, reconsidered the sizes proposed for the several portions of the Hackney Brook, or northern high-level intercepting Sewer, with a view to determine whether the diameter of portions of it might not be diminished without impairing its draining capacity, and with some diminution of the expense of the work, and having ascertained the opinion of their consulting engineers upon this point, have arrived at the conclusion that no diminution of the size of any portion of the sewer in question can be effected without materially impairing the efficiency of the scheme.

I am, &c.
(signed) *Richard Jebb.*

No. 81.

The Honourable *H. Fitzroy*, M.P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 31 October 1853.

With reference to my letter of the 20th instant, I am directed by Viscount Palmerston to transmit to you herewith a copy of a further letter from Mr. Walter Richardson, junior, on the subject of the drainage of the locality of the Norland estate, Shepherd's Bush.

Union Terrace, Notting Hill, 25 October 1853.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 81.

1, Union Terrace, Notting Hill,
My Lord, 25 October 1853.

I am desired to acknowledge the receipt of your Lordship's communication of 20th instant, referring the sufferers in this locality by the late inundations to the Metropolitan Commissioners of Sewers.

I am induced to trespass upon your attention in consequence of the concluding paragraph of your letter, by which it would appear that you have partially misconstrued the grounds of complaint. When the houses in the neighbourhood (now subject to inundations) were erected, the freeholders went to considerable expense in constructing very ample sewers, more than sufficient for the wants of the houses on the Norland estate, and they would not now be the cause of complaint if the Commissioners of Sewers had not granted to the owners and builders of property on the adjoining estate, called the Kensington Park Estate, permission to enter the said constructed sewers. The natural consequence is, that sewers sufficient for the number of houses on this property are too small for the number permitted to enter; more particularly as the water pours with great rapidity from the hill, causing the houses at the lowest point to be flooded with filth from the sewers. It appears to the parties affected by such overflow to be but just, that if caused by the act of the Commissioners of Sewers, they should provide some remedy for a state of things so disastrous in every particular. According to the report of their own engineer, the estimated cost of works to remedy the evil would be 13,000*l.*, and this sum was offered to be advanced by the memorialists to the said Commissioners upon security of the rates. I may mention, that I resided in my present house for eight years, without being subject to inundations; but, in consequence of the mass of buildings erected in 1852 on the Kensington Park Estate, I have since then been subject to frequent floodings.

For your Lordship's guidance, I have endeavoured to ascertain the value of property so circumstanced, and think I am correct in saying it cannot be less than 100,000*l.*, the owners and occupiers thereof contributing largely towards the sewer rate, as well as the parochial and Government taxes. I cannot refrain from drawing your Lordship's most particular attention to the heavy loss sustained by many of the tradesmen in consequence of these inundations. Compelled to keep a great portion of their stock in their basements, and receiving no notice of the floodings, they are unable to move their goods in time to prevent damage, and thus, in addition to the loss of customers and the dangerous consequences of the damp, they suffer largely in a pecuniary point. To the owners the result will be the total destruction of their property. Almost all the tenants residing in houses liable to such floodings have given notice to quit, and I feel certain that, unless some effectual and speedy remedy is applied, a neighbourhood once prosperous, and situate in one of the most improving suburbs of the metropolis, will be completely sacrificed. Believ-

Correspondence, &c.

ing the subject to be one well worthy of your Lordship's attention, I indulge in the hope that you will reconsider your decision, and permit a deputation to wait upon you to enter at great length into the causes of these inundations, and to suggest such alterations in the sewers as would, in the opinion of practical men, prevent any future flooding.

I remain, &c.
(signed) *Walter Richardson*, jun.

The Right honourable Viscount Palmerston.

No. 82.

The Honourable *H. Fitzroy*, M. P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 31 October 1853.

27 October.

I AM directed by Viscount Palmerston to transmit to you the enclosed letter, addressed to his Lordship by direction of the Sanitary Committee of Guardians for the parish of Lambeth, complaining of the grievance under which they labour arising from the open sewers, ditches and drains throughout the parish.

I am, &c.
(signed) *Henry Fitzroy.*

Enclosure with No. 82.

My Lord, Lambeth Workhouse, 27 October 1853.

THE Sanitary Committee of Guardians for the parish of Lambeth have directed me to address your Lordship upon an important subject connected with the duties they are at the present time called upon to perform under the Nuisances Removal and Diseases Prevention Act, and the rules and regulations recently issued by the General Board of Health by authority of that Act.

The committee are most anxious to give full effect to those rules and regulations, and are using all means in their power to remove every nuisance calculated to engender disease, and to mitigate it should it unfortunately become more prevalent; but there is one great and serious evil over which they have no control, namely, the open sewers, ditches and drains throughout the parish. The complaints made to the committee are constant and serious, and recent cases of death from cholera have been traceable to those cases.

In 1848 and 1849 the committee frequently addressed the Commissioners of Sewers on this subject, pointing out from time to time the want of sewers in many places, and offensive open ones in others; but as the powers of the Commission were limited, not much was done. Since that period the Commission has been re-organized, and within the last four years two or three rates have been levied upon the inhabitants of this parish, and a large sum raised; yet comparatively nothing has been done to improve their sanitary condition, and the complaints are loud and universal.

The committee, in the discharge of their duty, have lately addressed the Commissioners, with a view to their adoption of remedial measures in particular causes of complaint: the committee have in reply, "that the Commissioners regret that the state of the funds of the district will not enable them at present to execute works for the removal of the ground of complaint."

Under these circumstances, the committee feel that they would not properly discharge their duty to the inhabitants of this large and important parish, without respectfully and urgently representing to your Lordship the necessity of prompt measures for the removal of the monster grievance under which they labour.

I have, &c.
(signed) *W. T. Logan*, Clerk.

No. 83.

H. Waddington, Esq., to *Richard Jebb*, Esq.

Gentlemen, Whitehall, 2 November 1853.

I AM directed by Viscount Palmerston to transmit to you the accompanying letter from Mr. M'Whinnie, with its enclosure, relative to an open sewer in Crescent-place, New Bridge-street, Blackfriars.

I am, &c.
(signed) *Horatio Waddington.*

No. 84.

No. 84.

E. H. Woolrych, Esq., to the Honourable *Henry Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 2 November 1853.

I AM directed by the Metropolitan Commissioners of Sewers to acknowledge the receipt of your letter of the 31st October, transmitting, by direction of Viscount Palmerston, a letter addressed to his Lordship from the Sanitary Committee of Guardians for the parish of Lambeth, respecting the open sewers, ditches and drains throughout that parish.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 85.

E. H. Woolrych, Esq., to the Honourable *H. Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 7 November 1853.

I BEG to inform you, with reference to your letter of the 2nd instant, transmitting, by direction of Lord Palmerston, a letter from Mr. M'Whinnie, with a memorial from certain medical practitioners, relative to an open sewer at Crescent-place, New Bridge-street, Blackfriars, that the locality in question is situate within the jurisdiction of the City Commissioners of Sewers; and that the letter of Mr. M'Whinnie and its enclosure have been forwarded to the office of that Commission.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 86.

E. H. Woolrych, Esq., to the Honourable *Henry Fitzroy*, M.P.

Sir, 1, Greek-street, Soho, 7 November 1853.

I BEG to inform you that your letter of the 31st October 1853, transmitting a letter from Mr. Walter Richardson, jun., respecting the drainage of the locality of the Norland estate, Shepherd's Bush, has been laid before the Metropolitan Commissioners of Sewers.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 87.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 8 November 1853.

I AM directed by Viscount Palmerston to transmit to you, for your information, and to show the cheapness and efficiency of the tubular system, the enclosed copies of reports which his Lordship has received from the local Boards of Health of the places named in the margin, upon the works for drainage and water supply which have been executed in their respective districts.

Rugby, 25 October 1853.
Sandgate, 26 Oct. 1853.
Tottenham, 1 Nov. 1853.

I am, &c.
(signed) *H. Waddington.*

Enclosure, No. 1, with No. 87.

Sir, Rugby Local Board of Health, 25 October 1853.

IN reply to your letter of the 21st instant, I beg to inform you, that a system of tubular pipe drainage has been executed in the town of Rugby. The cost of the drainage was about 4,500*l.* This sum, together with the amount required for the water supply, was borrowed from the Provident Life Office, London, at 4*l.* per cent. interest, on mortgage of the rates of Rugby, with liberty to repay the same by instalments of 500*l.* (two instal-

Correspondence, &c.

ments having already been paid). The money to pay this principal and interest is obtained by the rental of the sewage (which is let on lease for 20 years, at 50*l.* per annum), the money received from the sale of water beyond the working expenses, and by two rates in the year upon the proeprty within the drainage area of the district, the last rate being at the rate of 5*d.* in the pound; and as the demand for water and the rateable value of the town increases, it is anticipated it will not be necessary to make the rates so high. The drainage has answered very well indeed. The pipes have not worn out or given way: the cases in which they have been stopped up are very trifling, and from causes which have been easily remedied. The Board consider that the successful working of the system is attributable in a great measure to having a constant and ample supply of water running down the sewers.

(signed) *C. E. Wrapshaw*, Clerk.

Enclosure, No. 2, with No. 87.

The Local Board of Health, Sandgate,
26 October 1853.

My Lord,

I beg to acknowledge the receipt of your Lordship's letter of the 21st instant, and to state, in reply, for the information of your Lordship, that the system of tubular drainage adopted by the General Board of Health, and which has been executed here with their sanction, is found to be efficient for the purpose, and of great practical utility in its application to this town.

This system, although not altogether free from objection, is perhaps the only one which could have been employed here with such favourable results: owing to its relative situation to the sea, being only a few feet above the level of high water, and resting on a bed of shingle, it would have been impracticable to have excavated to a sufficient depth for the construction of brick sewers with proper working gradients for draining the basements of the houses. To comply with the stipulations of the General Board of Health for deep drainage under these circumstances, it was necessary, even with the tubular system, to resort to low levels for the attainment of the above object; and for the principal sections, inclinations of 1 in 240 and 1 in 320 only could be given; upon the execution of the work, therefore, mainly depended its action, as subsequent experience has shown; but soon after its completion, it became apparent that a disorganization existed which interrupted the flow of matter to the sewage chamber, and, on examining the levels, it was discovered that most of the gradients were false, and at variance with the working drawings; thus, owing to defective workmanship, a portion of it had to be relaid, at a cost of 77*l.* 13*s.* 3*d.* to the contractor.

Many here state that the system is of diminishing glazed stoneware tubes, from 12 in. to 4 in. diameter, discharging their contents into a tank under the beach, with an outfall-pipe to the sea at low water.

The inconvenience attending the relaying of the defective parts of the work was confined to the re-opening of the street, without (as I am aware) any injurious effects upon the public health. The discovery of these defects so early is due to the smallness of the system; had it been larger, a corresponding lapse of time would have taken place as a natural consequence. Effluvia would have been emitted, poisoning the surrounding atmosphere, escaping into the houses, and thereby engendering disease as fearful and fatal as at Croydon.

I should have named, that on opening the ground for the adjustment of the levels, several of the 12-inch pipes were found cracked or split longitudinally, and also that another and greater obstruction was the insecure stopping of the junction-holes, during the progress of the work, with straw and other vegetable substances, which gave way, and admitted the shingle into the drains before connecting them with the houses. The attention of the Board has to be given occasionally to defects in the house services; but it is invariably to be attributed either to neglect, or to the insertion of foreign substances into them.

For defraying the cost of the combined works of drainage and water supply, the Board negociated a loan with the Provident Life Office for 3,500*l.*, at 4½ per cent., upon mortgage of the special district rates for 30 years.

The cost of the draining is estimated at 850*l.*

The operations of the Board in carrying out these important provisions of the Public Health Act have been followed by a decided improvement in the health of the district; and when the system shall be more fully developed, greater and more beneficial results may be anticipated.

I have, &c.

The Viscount Palmerston,
&c. &c. &c.

(signed) *William Pledge*, Clerk.

Enclosure

Enclosure, No. 3, with No. 87.

Tottenham Local Board of Health,
1 November 1853.

Sir,

In accordance with the request contained in your letter of the 21st ultimo, and by direction of the Tottenham Local Board of Health, I have to report that the district of Tottenham was brought under the provisions of the Public Health Act, 1848, by virtue of an Order of Her Majesty in Council in the year 1850.

Since that period, the Local Board have been engaged in executing combined works of drainage and water supply for the whole of the town portion of the district, through the medium of their own engineering officer.

The cost of the combined public works, consisting of the sewers, water mains, artesian wells, reservoirs, steam-engines, engine-house, and purchase of land, &c. (including some additional outlay to meet the requirements of the recent extraordinary extension in building operations within the district), has been about 10,000*l.* The total length of the sewers and water-drains consists of about 12 to 14 miles of each. The funds for the execution of these works have been raised, under the provisions of the Public Health Act, by way of loan, on the security of a rate called a special district rate, which loan, with interest, will be repaid in 30 years, by equal annual instalments, and the annual rate to meet such instalments is about 5*d.* in the pound on the rateable value of the property benefited by the works.

The Board have much satisfaction in stating, that the sewers, which consist of glazed stoneware pipes of various dimensions, have answered to their entire satisfaction, no instances having occurred of breakage, stoppage, or other casualty.

Since the completion of the public works, all cesspools have been abolished, and water-closets substituted for privies to the poorest inhabitants.

With reference to the works of sewerage, the Local Board have only to regret the mode of disposal of the sewage, and which has for some time past engrossed their earnest attention. It is at present conducted into the River Lea, a means of disposal which the Board feel to be very objectionable, and they are now engaged in considering the practicability of adopting some one of the methods which scientific observation has pointed out for deodorizing it, and rendering it available for agricultural purposes.

In conclusion, the Board wish to observe, that the water supply has in this, as they consider it ought in every district, engaged their first consideration, as no efficiency can be expected in any system of drainage without a constant and copious supply of water.

In the Tottenham district the use or introduction of cisterns and tanks has been obviated, an abundant and continuous supply of pure water, under pressure, having been conveyed into every house, from the mansion to the humblest cottage, at a very trifling cost, the charge for a cottage rated at 10*l.* being only 2*s.* 6*d.* per annum.

(signed) *W. Heath*, Clerk.

To Henry Fitzroy, Esq.

No. 88.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 8 November 1853.

I am directed by Viscount Palmerston to transmit to you the enclosed copy of a report from Messrs. Dymond & Sons, on the system of pipe drainage carried out in the district of St. Thomas, Exeter; and I am to recommend the same to your earnest and serious attention with reference to the works to be undertaken for drainage in London.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 88.

Report on the System of Pipe Drainage carried out in the District of *St. Thomas, Exeter.*

My Lord, Exeter, 31 October 1853.

In the following report we shall endeavour to supply the information sought by your Lordship in the letter addressed on 21st instant by Mr. Fitzroy to the clerk of the St. Thomas' Local Board of Health.

The district for which pipe sewerage and drainage works have been provided contains about 678 houses. The main public sewers are 12,767 feet, or about 2⅖ miles in length. They consist entirely of glazed stoneware pipes, with socket joints, and their internal diameters gradually increase from four or six inches at their head to 18 inches at the final outfall.

Besides these, there are several public submain sewers or branches thrown out from the mains to collect the drains of groups or rows of houses. There are also stoneware pipes, varying from four to nine inches in bore, according to the number of houses or superficial area to be drained: their aggregate length is 1,900 feet.

Correspondence, &c.

The expense incurred in public sewerage works is as follows:—

	£.		
Public main sewers	1,341	10	3
Public submain sewers	90	–	–
Drainage of the surface of public streets, lanes and footpaths	100	–	–
	£. 1,531	10	3
Add to this,—			
Expense yet to be incurred in the construction of a culvert for the diversion of a natural watercourse, heretofore employed as a public sewer, but now superseded by the new system	140	–	–
	£. 1,671	10	3

The above amount forms part of a sum of 4,000 *l.* borrowed by the Local Board for the foregoing and other purposes. This loan, with interest at 4½ per cent., will be repaid in less than 30 years, by annual instalments. The instalments are met by a special district rate of 7 *d.* in the pound on houses, and 1¾ *d.* in the pound on land.

It should here be stated, that the works of the Local Board include the construction of tanks to receive the sewage at the outfall. The cost of this portion of the works, including the purchase of about 1½ acre of land, a right of way, &c., was about 700 *l.*, a sum which is not included in the above 1,671 *l.* 10 *s.* 3 *d.* These tanks have been let for a term to a chemical manure manufacturer, at a rent which, though moderate, produces a return to the Local Board of about 6 per cent. per annum on their expenditure upon this portion of their works, or of about 1¾ per cent. on the total cost of the public sewers and receiving tanks.

Of the 678 houses lying within the range of the new public sewers, 620 have already been connected with them by pipe drains; 38 yet remain to be so connected, and 20, being about to be pulled down or altered, or from being under peculiar circumstances, do not require to be dealt with at present.

All the private drains are formed of glazed stoneware pipes; those receiving the contents of single water-closets are of four inches diameter; and those carrying off the flow into sinks are of three inches diameter.

All privies and cesspools have been abolished, and water-closets have been substituted for them. As a very considerable amount of house drainage has been executed by parties employed directly by the owners of the property, and not by the Local Board of Health, it is difficult to ascertain the exact cost of private works; but the following statement is believed to be accurate:—

	£.		
Average cost of private drainage works (including erection of water-closets, or conversion of privies into water-closets), per house	2	17	1
Ditto - ditto - ditto private water supply, ditto	–	18	1
	£. 3	15	2

We now come to the second part of the inquiry, viz., "How the drainage has answered, and whether the pipes have worn out, given way, or have been stopped up?"

The drainage, both public and private, has fully answered its purpose; the public sewers have now been in use for two years; and although, from the level character of the district, the best inclination to be obtained for the 15 and 18 inch main sewer is only 1 in 1,000 for a length of 3,347 feet, it has proved fully adequate to carry off not only the ordinary rain-fall and house drainage, but extraordinary storms. No stoppage has occurred in a public sewer, and the greatest amount of deposit in them has been about 1½ inches. This is removed by the natural flushing afforded by rainy weather. As a matter of precaution, it was deemed prudent to provide a simple means of flushing the most level portion of the main sewer; but there has hitherto been no necessity for its use. In the private drains there have been about a dozen stoppages since the new works have been in operation. The poorer classes were accustomed to dispose of refuse of various kinds by throwing it into open pits in their courts or gardens, which served the double purpose of dust-bin and cesspool. It was not surprising that new habits of order and decency were not in all cases formed as rapidly as the new water-closets were completed, and hence half the number of stoppages were found to have been occasioned by pieces of flannel rags or straw carelessly passed into the drain-pipe through the closet-pan. These instances are becoming more and more rare as the people discover that the inconvenience and expense arising from such act of carelessness fall on the perpetrator alone. The other cases of stoppage arose from the washing of fine gravel and sand from the surface of courts and paths into the stone-ware syphon traps attached to sinks. By a change in the form of the sinks, this difficulty has been obviated; we apprehend that both description of stoppage would have occurred of whatever materials the drains had been constructed. No pipes have worn out, nor do any exhibit a tendency to do so. In short, a properly made stone-ware pipe may be regarded as imperishable—a quality which is not possessed by any other material employed in the construction of sewers. Pipes have occasionally been broken by careless workmen before being laid in the ground, but

but none have given way afterwards. Although the larger-sized pipes were not formerly of the thickness which we have in our later works thought it desirable to provide, and although a large proportion of these pipes were laid at a depth of more than 10 feet below the surface, no accident or failure has occurred from external pressure, the weight of superincumbent soil, or any other cause: the nature of the ground in which the pipes for the main sewer were laid, a river gravel, rendered it necessary to exercise much care in filling in the trenches, lest the pipes should be broken by falling stones. The clerk of the works had instructions to see every pipe inserted in its proper direction and level, its bed duly formed, and the filling in at the sides and top cautiously and tightly rammed. Attention to these instructions has rendered St. Thomas free from the accidents and failures which have elsewhere occurred from neglect of these precautions.

The foregoing observations apply more particularly to the special points on which information is sought in Mr. Fitzroy's letter. We take the liberty of adding a few general remarks in conclusion.

St. Thomas is a suburb of Exeter, divided from that city by the River Exe, and bearing much the same relative position with it as Southwark does with London. Like Southwark, too, it is perfectly flat, and though the Exe is not here a tidal river, it often rises many feet in wet seasons, and inundates the adjacent country. From these natural difficulties, the design and execution of an effectual system of sewerage required more than usual care, and it was not without some degree of professional diffidence that we entered upon the employment of a system, of which experience had been very limited, and against which was arranged the weight of great engineering names. But an attentive and unprejudiced consideration of the subject led to the conclusion, that sewers of stone-ware pipes, within reasonable limits as to size, were the cheapest and best in original construction, and the most manageable and economical in after-use that could be devised.

The result has most completely justified the opinion up to about 18 inches in diameter; we entertain no question as to the superiority of stone-ware over every other material. Below this size it is more economical than bricks; but above it, brick is cheaper, and, perhaps, preferable on other grounds. Stoneware pipes are, in our opinion, unquestionably the best for house drainage, and we are as fully satisfied of their superiority in public sewerage. The choice of them in other places in which we are engaged in superintending works of this nature, is a practical evidence of this. The chief element of success appears to us to consist in strict and zealous attention to minor details in execution; if this be given, we see no reason to apprehend any damage or obstruction in the main system, and in the event of their occurrence on private premises, they are readily set right. We have found no difficulty in providing by very simple means for the removal of noxious gases generated in the sewers for flushing, if desired, and for ascertaining the locality of any stoppages.

We have, &c.
(signed) *Robert Dymond* & Sons.

To the Right hon. Viscount Palmerston, M.P.,
Secretary of State for the Home Department.

No. 89.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 8 November 1853.

Referring to your letter of the ulto., I am directed by Viscount Palmerston to transmit to you the enclosed copy of a letter from the Treasury, explaining the grounds of the refusal of the Public Works Loan Commissioners to advance the sum required by the Metropolitan Commissioners of Sewers. I am at the same time to request, that you will state what were the causes which prevented so many great bodies in the city from lending you money.

I have, &c.
(signed) *H. Waddington.*

Enclosure with No. 89.

Sir, Treasury Chambers, 1 November 1853.

The Lords Commissioners of Her Majesty's Treasury, having had before them your letter of 19th ultimo, transmitting copy of a communication from the Commissioners of Sewers, setting forth the difficulty which they experience in obtaining the money which the Act of last Session empowered them to raise for the purpose of executing certain drainage works in the metropolitan district, and expressing the wish of Viscount Palmerston to know why the Exchequer Loan Commissioners decline to lend the money asked from them; their Lordships desire me to state, for the information of the Secretary of State, that, in order to save time, they are pleased to waive the more general course of proceeding, which would have been to obtain from the Public Works Loan Commissioners a reply to the question put by his Lordship, as the Lords Commissioners are themselves advised generally with

Correspondence, &c.

respect to the motives which governed the Exchequer Loan Commissioners. Their Lordships understand that the application of the Metropolitan Commissioners of Sewers was for a loan of 200,000 *l.*, to be advanced to them within nine months. Now, the whole sum made available by law annually for Public Works loans (exclusive of Ireland) is 300,000 *l.* Thus referring to the engagements which the Public Works Loan Commissioners had already contracted, the application of the Metropolitan Commissioners of Sewers, taking into consideration the time within which the money would be wanted, actually went in one sum far beyond the entire provision made by Parliament for all purposes for which loans might be required, and this, too, at a time when, in consequence of extraordinary demand upon the Exchequer, it was desirable to restrain, rather than extend the scale of the public advances; the Public Works Loan Commissioners, however, in advising that application should be made in other quarters, did not intend absolutely to preclude the renewal of the request to them, if and so far as urgent necessity might require it. Their Lordships desire me, moreover, to observe, that in the letter from the Commissioners of Sewers, which accompanied your communication, no reference is made to the causes which may have prevented so many great bodies in your city from lending them money, and that is a subject which may, in their Lordships' opinion, be worthy of the attention of Viscount Palmerston, as it cannot, their Lordships apprehend, be on account of the rate of interest which it was proposed to fix at five per cent.

It is hardly necessary for their Lordships to observe, that the Public Works Loan Commissioners could not lend any sum of money whatever, except upon clear and perfect security.

I am, &c.
(signed) *C. E. Trevelyan.*

The Honourable Henry Fitzroy,
Home Office.

No. 90.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 8 November 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed memorial of the Governors and Guardians of the parish of St. Mary, Newington, in the county of Surrey, respecting the open ditches in that parish, and to request that you will favour his Lordship with your observations thereon.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 90.

To the Right honourable Viscount *Palmerston*, Secretary of State for the Home Department.

The humble Memorial of the Governors and Guardians of the Parish of *St. Mary, Newington*, in the County of *Surrey*;

Showeth,

THAT your memorialists are the representatives of this large and densely populated parish, being one of the metropolitan parishes in the borough of Lambeth, containing a population of nearly 70,000 souls.

That your memorialists, in common with other parishes, have been served with the Orders of the General Board of Health of the 20th day of September last, directing your memorialists to adopt certain precautions, and to take decisive steps under the "Nuisances Removal and Diseases Precaution Act," in order, if possible, to avert the spread of cholera, or other epidemic or indemic diseases.

That, remembering the fatal effects of the cholera in this parish in the years 1848–49, and warned by past experience of the necessity of using immediate and active exertions, your memorialists had previously to the issuing of the above-named order taken such steps as they deemed needful to prevent the introduction of the disease, or, in the event of its introduction, to mitigate its virulence and avert the spread thereof, by the abatement of those nuisances over which the law has given your memorialists a certain control.

That many hundreds of notices have been served upon owners or occupiers of premises for the removal of such nuisances, arising from foul privies, cesspools, the keeping of swine, &c. &c., which have been in the majority of cases removed, without the necessity of taking the parties offending before the justices.

That your memorialists have placed themselves in conjunction with the Commissioners of Police, whose officers have been directed to make a daily report to your memorialists of all such nuisances as come under their observation in the discharge of their duties, which report is regularly made, and has been productive of much benefit.

That, acting under the advice of Dr. Milroy, who attended a special meeting of your memorialists from the General Board of Health, your memorialists, among other matters, recommended by him, have appointed their district medical officers inspectors of nuisances, directing

directing them to carry out the instructions of the General Board of Health, so far as they relate to such medical officers.

That the medical officers have reported to your memorialists the result of their several inspections, and your memorialists have given directions to their officers to carry into immediate action the provisions of the "Nuisances Removal and Diseases Prevention Act" in all such cases as come within the meaning of that statute.

That your memorialists now desire to bring before your Lordship's attention the grievous evils under which this parish has so long suffered, and is still suffering, from the existence of the open ditches under the jurisdiction of the Commissioners of Sewers, over which, as your Lordship is aware, your memorialists have no control.

That the evils resulting from these open ditches are incomparatively greater than those resulting from the nuisances over which your memorialists have control, as may be proved by the reports of the police, and from the opinion of the medical officers, as embraced in their reports, all of them agreeing in the language of one of them, which your memorialists now submit to your Lordship, "that these ditches no doubt would severely aggravate any epidemic, endemic or contagious disease, and ought not to remain open so near dwellings."

That your memorialists are daily receiving letters from the inhabitants loudly complaining of the condition of these open ditches, and praying for the interference of your memorialists.

That at the back of the workhouse of this parish one of these open ditches exists, concerning which the medical officer of the workhouse has certified that he believes it to be highly dangerous to the health of the inmates, a large number of whom have lately been suffering from diarrhœa, and two or three cases of decided cholera have occurred, and upon viewing which ditch Dr. Milroy approved of an application being made to your Lordship.

That your memorialists have made repeated and urgent applications to the Commissioners of Sewers, but without effect, the Commissioners stating their inability, from want of funds, to remedy the evil.

That your memorialists cannot refrain from intimating to your Lordship the discouragements under which they labour in improving the sanitary condition of this parish while these open ditches remain, many poor persons being deprived of means of getting their living by the operation of the law which so properly prevents the keeping of swine, and others in humble circumstances being compelled to adopt a better system of drainage from their houses, while the most fruitful source of evil remains year after year unabated.

That, impressed with a deep sense of the responsibility of their present position, and aware of the interest your Lordship feels in every measure connected with the sanitary condition of the people, your memorialists humbly submit to your Lordship the adoption of some immediate steps for the removal of these crying evils which your memorialists fear may be allowed to continue for some years longer if left in the hands of the Commissioners of Sewers, with their present limited means.

And your memorialists, as in duty bound, will ever pray.

Signed by order of the Board, at their meeting held on the 27th day of October 1853.

(signed) *Joseph Burgess*,
Clerk to the Board.

No. 91.

E. H. Woolrych, Esq., to the Honourable *Henry Fitzroy*, M.P.

Sewers Office, 1, Greek-street,
Sir, 11 November 1853.

I HAVE the honour to convey to you, by direction of the Metropolitan Commissioners of Sewers, for the information of Viscount Palmerston, the request of the Commissioners, that his Lordship would be good enough on some early day to receive a deputation from their body, accompanied by their consulting engineers, Sir W. Cubitt and Mr. Robert Stephenson, on the subject of the intercepting sewers north and south of the Thames, described in the reports of their engineers, of which copies have already been transmitted to his Lordship.

I have, &c.
(signed) *E. H. Woolrych.*

No. 92.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sewers Office, 1, Greek-street,
Sir, 11 November 1853.

I AM directed by the Metropolitan Commissioners of Sewers to acknowledge the receipt of your letter of the 8th instant, transmitting the copy of a report

Correspondence, &c.

from Messrs. Dymond & Sons on the system of pipe drainage carried out in the district of St. Thomas, Exeter, recommending the same to the earnest and serious attention of the Commissioners with reference to the works to be undertaken for drainage in London, and I am instructed to state, that the attention of the Commissioners will be directed to the contents of that report.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 93.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sewers Office, 1 Greek-street,
Sir, 11 November 1853.

I AM directed by the Metropolitan Commissioners of Sewers to acknowledge the receipt of your letter of the 8th instant, transmitting copies of reports received by Viscount Palmerston from the Local Boards of Health of Rugby, Sandgate and Tottenham, upon works of drainage and water supply executed in their several districts.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 94.

Richard Jebb, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 11 November 1853.

I HAVE to acknowledge the receipt of your letter of the 8th instant, addressed to the Metropolitan Commissioners of Sewers, enclosing copy of a letter from the Treasury, explaining the grounds of the refusal of the Public Works Loan Commissioners to advance the sum required by the Commissioners of Sewers, and requesting them to state what were the causes which prevented so many great bodies in the city from lending the money.

On the part of the Commissioners of Sewers, I beg to state, that in one instance the company applied to declined on the ground that their deed of settlement did not authorise loans on the security of rates; that in other instances the condition of the money market was alleged as the cause of refusal; and that in the remaining instances, although no such ground of refusal was expressly alleged, it appeared more or less to have operated in inducing the bodies in question to refuse the application.

I am now, however, enabled to add, that the Rock Assurance Company have agreed to advance the entire amount (200,000 *l.*) at 4½ per cent., provided their counsel advise them to accept the security, and that the Commissioners are in daily expectation of receiving a final answer from that body.

I am, &c.
(signed) *Richard Jebb.*

No. 95.

Richard Jebb, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 11 November 1853.

I HAVE to acknowledge your letter of the 8th instant, addressed to the Metropolitan Commissioners of Sewers, enclosing a memorial (herewith returned) of the governors and guardians of the parish of St. Mary, Newington, respecting the open ditches in that parish, and requesting the Commissioners to give Viscount Palmerston their observations thereon.

On the part of the Commissioners, I beg to state, for the information of his Lordship, that all the allegations in the memorial as respects the open ditches in the parish are substantially correct. The answers, however, given to the memorialists on the several occasions when they addressed the Commissioners upon the same subject, were not confined to mere general statements of the inability of the

Correspondence, &c.

the Commissioners for want of funds to remedy the evil; it was pointed out to the memorialists that the present covering over of the open sewer behind the workhouse (part of the Great Earl sewer) would not only be very costly, but must of necessity be a temporary work, as well as a very insufficient remedy, and that no effectual and permanent remedy could be afforded until the main drainage works should be carried out, which the Commissioners entertained a hope might be effected at an early day.

The entire Surrey and Kent district abounds in open ditches of the same character as those described in the memorial. In different localities considerable lengths of these open sewers have been covered in by the Commissioners, either where the work would be of a permanent character, or where a great nuisance would thereby be alleviated at a comparatively trifling expense; but in the latter case it has been usual to require a private contribution towards the work from the inhabitants of the immediate locality. An attempt generally to cover in the existing open drains before deep outlets are provided, would result in the expenditure of the entire rates of the district in works which must be abandoned as soon as the deep drainage is provided, and which in the meantime would afford a very imperfect remedy, and in some instances even aggravate the evil.

I am, &c.
(signed) *Richard Jebb.*

No. 96.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 19 November 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed memorial from inhabitants of New Bridge-street and Crescent-place, Blackfriars.

And I am to request that you will return the same to me, and report upon the matter complained of therein for Lord Palmerston's information.

I am, &c.
(signed) *H. Waddington.*

No. 97.

The Honourable *H. Fitzroy*, M.P., to *Richard Jebb*, Esq.

Sir, Whitehall, 19 November 1853.

I HAVE laid your letter of the 11th instant before Viscount Palmerston, and I am to express his Lordship's satisfaction that the Commissioners of Sewers have a prospect of obtaining on loan the entire amount of money required by them.

I am, &c.
(signed) *Henry Fitzroy.*

No. 98.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 21 November 1853.

I AM directed by Viscount Palmerston to transmit for your consideration the enclosed copy of a letter from Mr. Charles Fowler, stating generally his views with regard to the drainage of London, and the disposal of the sewage matter. 4 November.

Mr. Fowler has been requested, by Lord Palmerston's directions, to communicate to you any plan which he may wish to propose for these purposes.

I am, &c.
(signed) *H. Waddington.*

Correspondence, &c.

Enclosure with No. 98.

My Lord, Fairseat, near Wrotham, 4 November 1853.

Although feeling great scruples in intruding upon your valuable time and attention, I venture to think that the importance of the object, and the great interest your Lordship has evinced in regard to it, may justify me in addressing you.

The sanitary improvement of the metropolis, and saving the Thames from its present state of pollution, have long been urgently called for, and with a rapidly increasing population, and a visitation of cholera, the necessity of some effectual measure is becoming every day more vital and urgent: such a measure must obviously embrace a more effectual system of drainage, and a scheme for that purpose has lately been announced by the Commissioners of Sewers.

It would not be compatible with the nature or limits of this communication to enter into a detailed discussion of the merits of that scheme; but, after attentive consideration, I venture to state my confident opinion, that, however correct in its engineering details, as vouched by the high authority of the consulting engineers, it is defective in principle, and will fail to accomplish the important objects desired, for the river will still continue to be the receptacle of all the filth; the value of it, as an incalculable source of fertility, will still continue to be lost, and its noxious influence still felt, although, perhaps, mitigated by being removed to some little distance, where, besides the local nuisance so created, the intense malaria arising from such a concentration of foul matter, will be wafted over the metropolis, whenever the wind sets in that direction.

This plan, involving an estimated outlay of nearly a million sterling, as far as regards the north shore of the Thames, does not profess to embrace more than the upper or suburban districts, leaving by far the greater portion of the sewage on that side to be discharged into the river, as at present, so that, if the scheme can be rendered effectual to the extent proposed, it will afford but a very limited and insufficient relief.

It may be important also to observe, that the proposed works, involving so large an outlay, are to be undertaken by a body which may be considered transient and unsettled, who are conscious of the inefficiency, as well as instability, of their constitution. I state this without the slightest impeachment of the character or conduct of the Commissioners, who are entitled to the highest respect and confidence; but, in justice to them as well as the public, such important works should not be undertaken under such circumstances, but by a well-organized and vigorous body, with full powers and ample means at their disposal.

I should not have felt justified in thus denouncing the above scheme, but from a firm conviction that other and more effectual means might be adopted, by which, instead of pouring the sewage into the river, the foul water might be distributed over a wide extent of open country to fertilize the land, instead of poisoning the inhabitants of the metropolis, or, as was well expressed by a noble Lord in advocating the great object, "giving the people food, instead of fever."

Having long been an attentive observer of, as well as an actor in, many proceedings relative to sewage and sanitary improvement, I venture to think that my views on the present occasion are strictly practical, and, without pretending to originality, I have endeavoured to avail myself of the skill and knowledge evinced by many talented and distinguished individuals with whom I have been associated for this purpose on various occasions, and to whom I would fain give all the credit due to their respective talents and exertions for the public good.

Without entering into a detailed description of the plan that I wish to bring under your Lordship's notice, I will take leave to state some of its leading features.

It does not involve any organic change in the construction of the existing sewers, as is contemplated in the plan of the Commissioners.

It can be carried out in distinct and separate compartments, and at successive periods, so as to profit by experience as the work proceeds.

It will save the river from being the receptacle of the drainage and its present pollution, except when there has been much rain, at which times no nuisance will be experienced, the foul water being greatly diluted, there being an increased volume and flow of water to carry it off, and no evaporation or effluvia.

The works required will be quite of an ordinary and practicable nature, easy to be accomplished, and of a very ascertainable cost.

The sewage water is to be raised and conveyed by engine-power to commanding levels, so as to be distributed over the land by irrigation, and thus to be rendered easily available for fertilization.

This is calculated to produce a return that will first reimburse the expense of the working power, and further, in all probability, produce a considerable net revenue.

(This latter is not proposed as a necessary result, but an important recommendation, as it is only at present pretended to remove the nuisance more effectually and cheaply than by any other means.)

It may be superfluous on the present occasion to trouble your Lordship with details which will be more properly the subject of technical investigation; but, having before stated that I profess to proceed on strictly practical grounds, I am desirous that my views should be subjected to that kind of test. I am willing, therefore, if your Lordship should think fit to refer them for examination, to explain the same to any competent and unbiassed persons; presuming that I shall not be regarded as impeaching the judgment of the eminent engineers consulted by the Commissioners; for, admitting them to be right in the conclusions they have

have formed on the views and objects submitted to them, yet I profess to proceed on entirely different bases.

If great arterial sewers are necessary, those now projected may be the best; but I venture to assume that those great works are not required; therefore, as regards their projectors, I am at issue certainly, "*ab origine*," but not as to the "*modus operandi*."

In short the result of my plan will be to form a reciprocating system, analogous to that of the veins and arteries of the human body.

The water companies send the simple fluid into the metropolis, which eventually passes into the sewers, from whence it will be pumped back into the country, both operations (similar and equally practicable), concurrently promoting their respective and essential purposes of supporting and promoting life and health.

In conclusion, it may be proper to add (being unknown to your Lordship), that, as an architect of more than 30 years' standing, I have designed and constructed the Hungerford and Covent Garden Markets, the Duke of Northumberland's Conservatory at Sion, the Devon Lunatic Asylum, the London Fever Hospital, and many other public works. At present I am partly retired from practice, being obliged to reside in the country for the benefit of my health.

Trusting that the object of this communication will be rightly appreciated, and be deemed an excuse for thus intruding on your notice,

I have, &c.
(signed) *Charles Fowler*,
(Fellow and twice Vice-president of the Institute of British Architects), late of Gordon-square.

No. 99.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sewers Office, 1, Greek-street,
Sir, 23 November 1853.

I AM directed by the Metropolitan Commissioners of Sewers to inform you, with reference to your letter dated the 19th instant, transmitting, by direction of Viscount Palmerston, a memorial from Mr. J. Collins, and other inhabitants of Crescent-place and New Bridge-street, Blackfriars, relative to an opening made in the road there, and a shaft of considerable dimensions sunk into the main sewer, that the locality in question is subject to the jurisdiction of the Commissioners of Sewers for the City of London, and not of this Commission. I beg to return the memorial referred to, in conformity with your request.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 100.

The Honourable *H. Fitzroy*, to the Commissioners of Sewers.

Gentlemen, Whitehall, 24 November 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed letter from the Rev. G. Mansfield, incumbent of St. Peter's, Saffron-hill, complaining of the state of the Fleet Ditch at the back of St. Peter's Church.

81, Hatton Garden, 10 November.

I am, &c.
(signed) *Henry Fitzroy*.

Enclosure with No. 100.

My Lord, 81, Hatton Garden, 10 November 1853.

I TRUST you will pardon this intrusion on your valuable time; but an application to your Lordship seems to me the only course now left.

I write in reference to the Fleet Ditch, which is open its whole breadth, and at least 100 yards in length, at the back of St. Peter's Church, Saffron Hill, close to our Infant School, of 120 children, and in a densely populated neighbourhood.

Ever since the first approach of the cholera this year, I have been endeavouring to have this great nuisance remedied, but in vain. I have written to the Sanitary Committee of the Board of Guardians about it. I have inspected it formally in company with them, and through them, I have had it brought before the proper authorities. I have written about it to the "Times" newspaper, with a view to bringing it still more prominently before the

Correspondence, &c.

persons whose duty it is to remedy such matters; and the "Times" has written special articles on those letters of mine, which appeared, urging the speedy abatement of this and other nuisances in this neighbourhood; but all has been to no purpose. I have just now returned from another visit to this abominable place, and so foul was the stench, and so filthy the state of this monster sewer and its margin, that, apprehensive of illness, although by no means a squeamish person, I have been obliged to have recourse to preventives; and, to-day, this ditch is in a worse state than when I first drew attention to it and complained of it.

May I therefore humbly request your Lordships' interference in the matter, as it would seem that nothing short of this will be effectual.

I have, &c.

The Right Hon. Lord Palmerston. (signed) *Geo. Wansfield,*
Incumbent of St. Peter's, Saffron Hill.

No. 101.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 26 November 1853.

16 November.

I am directed by Viscount Palmerston to transmit to you the enclosed copy of a report which his Lordship has received from the clerk to the Local Board of Health at Barnard Castle, on the combined plan of waterworks and pipe sewerage which has been adopted at that place.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 101.

My Lord, Barnard Castle, 16 November 1853.

In reference to the letter addressed to me by Henry Fitzroy, Esq., on the 21st ultimo, requesting me to furnish your Lordship with a report of the system of pipe drainage, &c., adopted in this place, I beg to inform your Lordship, that a combined plan of waterworks and pipe sewerage has been carried into effect here at a total cost of about 6,000*l.*, of which about 1,900*l.* may be stated to be the proportion for sewerage, and the remainder for the waterworks. The amount has been raised by loan, the interest and annual portions of the principal whereof, distributed over 30 years, are levied by special district rate.

I beg to inform your Lordship, that the Local Board of Health of this place see no reason to doubt that the system of pipe drainage here, combined as it is with water supply, will fully answer the purpose intended by it. We have hitherto had no instances of pipes breaking, giving way, or wearing out. There have been three or four cases of stoppage in branch portions of the work, but all clearly referable to defective workmanship, or careless or wilful conduct. In one instance the contractors had lost the level laid down upon the engineer's plan in bringing up a branch, and it is upon too dead an inclination. Some portions of this branch will, I think, ultimately have to be relaid, at a probable cost of 7*l.* or 8*l.* In the other cases the inlets had been left exposed with loose coverings for several days, and large stones and other substances had been placed therein, either carelessly or maliciously.

I have to state that the medical officer of the Poor Law Union, and another respectable medical gentleman in the town, have assured me, that during this autumn the town has been unusually free from diarrhœa and other autumnal epidemics.

I beg leave most respectfully to suggest to your Lordship the propriety of investing local boards of health with the powers conferred by clauses 64 to 83 of the Town Improvement Clauses Act (10 & 11 Vict. c. 34), and clauses 28 to 36 inclusive of the Police Clauses Act (10 & 11 Vict. c. 89).

I have, &c.

The Right Hon. Lord Palmerston. (signed) *Geo. Brown,*
Clerk to the Barnard Castle Local Board of Health.

No. 102.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sewers Office, 1, Greek-street,

Sir, 26 November 1853.

I am directed by the Metropolitan Commissioners of Sewers to acknowledge the receipt of your letter of the 21st instant, transmitting, by direction of Viscount Palmerston, the copy of a letter by Mr. Charles Fowler respecting the drainage of the

the metropolis, and to state that Mr. Fowler proposes to attend an early meeting of the Commissioners, for the purpose of explaining to them his views on the subject referred to.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 103.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sewers Office, 1, Greek-street,
Sir, 1 December 1853.

I BEG to inform you that your letter of the 23d instant, transmitting, by direction of Viscount Palmerston, a copy of a report by the clerk of the Local Board of Health at Barnard Castle, upon the combined plan of waterworks and pipe sewerage adopted at that place has been laid before the Commissioners.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 104.

R. W. Grey, Esq., to *R. Jebb*, Esq.

My dear Sir, Whitehall, 3 December 1853.

LORD PALMERSTON will be able to receive your deputation on Wednesday next at half-past five, at the Home Office.

Your's, &c.
(signed) *R. W. Grey.*

No. 105.

R. W. Grey, Esq., to *R. Jebb*, Esq.

My dear Sir, Whitehall, 5 December 1853.

BE so good as to come at six, instead of half-past five, on Wednesday.

Your's, &c.
(signed) *R. W. Grey.*

No. 106.

Richard Jebb, Esq., to *Horatio Waddington*, Esq.

Sir, 1, Greek-street, Soho, 12 December 1853.

WITH reference to your letter of the 21st ultimo, transmitting, by direction of Viscount Palmerston, for the consideration of the Metropolitan Commissioners of Sewers, copy of a letter from Mr. Charles Fowler, stating generally his views with regard to the drainage of London and the disposal of the sewage matter, I beg to state, for the information of his Lordship, that the Commissioners received that gentleman on the 29th ultimo, and that, having referred to the report of a former Commission on the various plans of drainage submitted to the predecessors of that Commission in the year 1849, among which that of Mr. Fowler was included, and having considered the additional explanations and details which, at the interview above referred to, he brought under their notice, the Commissioners are of opinion that his suggestions cannot advantageously be adopted.

I am, &c.
(signed) *Richard Jebb.*

No. 107.

Richard Jebb, Esq., to the Right honourable Viscount *Palmerston*, M.P.

My Lord, 1, Greek-street, Soho, 14 December 1853.

WITH reference to what took place at the interview which the Metropolitan Commissioners of Sewers had with your Lordship on the 7th instant, I have the

Correspondence, &c.

honour, on their behalf, to submit to you in writing their views respecting the commencement of the works of main drainage specified in the reports of their engineers made in October last, and to request, through your Lordship, the sanction of Her Majesty's Government to the immediate commencement of those works.

The works in question are two; they comprehend, on the north side of the Thames, the Hackney Brook, or northern high-level intercepting Sewer, with a branch, estimated to cost about 300,000 *l.* This work is essential for the drainage of the districts through which it is designed to pass; and it will form an important part of the general system of interception on the north side of the river.

On the south side the works now proposed consist of two sewers, uniting at Deptford Creek; one of them a high-level catch-water sewer, discharging by gravitation; the other a low-level sewer, discharging by pumping. The cost of these latter sewers, with their branches, is estimated at about 750,000 *l.* Until they are completed, no effectual drainage can be provided for the greater part of the districts south of the Thames.

The means at the disposal of the Commissioners towards the execution of these works, after providing for other objects requiring immediate attention, do not exceed 150,000 *l.*; nor can any material addition for the same object be made hereafter to that amount, without fresh powers from Parliament. In the absence of such powers, therefore, the Commissioners neither now have, nor will have, the means of completing the works referred to; and as the partial execution of them would be comparatively useless, the Commissioners are of opinion that it would be neither wise nor just towards the rate-payers to commence the works until a definite prospect can be obtained of completing them at no distant period. At the same time, to postpone the commencement of them would, it is believed, be extremely unwelcome to the inhabitants of the districts intended to be benefited by them, who are now suffering from the want of an efficient system of drainage, and are impatient to see the actual commencement of works so essential to their health and comfort.

The Commissioners therefore propose, should it meet the sanction of the Government, to enter at once into contracts for the execution of a portion of each of the two works above-mentioned; and I have respectfully, on their part, to request the favour of your Lordship's acquainting them whether this course meets with your approbation, and whether your Lordship is prepared, in an early period of the ensuing Session of Parliament, to take steps for obtaining for the Commission the additional powers required to enable them to complete the works in question.

I have, &c.
(signed) *Richard Jebb.*

No. 108.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 17 December 1853.

12 December.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a letter from Sir William Clay, forwarding a letter addressed to him by Mr. L. Currie, of Bromley, Middlesex, on the subject of the proposed drainage of the northern part of the metropolis as affecting his and other distilleries.

I have, &c.
(signed) *H. Waddington.*

Enclosure No. 1, with No. 108.

Fulwell Lodge, Twickenham,
12 December 1853.

My dear Lord,

I AVAIL myself of your kind permission to transmit to your Lordship the letter to which I referred, from Mr. Currie, proprietor of a large distillery at Bromley. I think you will agree with me, that this gentleman's observations are well deserving of attention in the consideration of any plan for the arterial drainage of the north of London.

I hear that the Hackney deputation were much gratified by your Lordship's obliging attention to their statements.

I am, &c.
(signed) *Wm. Clay.*

Right honourable Viscount Palmerston.

Enclosure

Enclosure, No. 2 with No. 108.

Correspondence, &c.

My dear Sir William, Bromley, Middlesex, 28 November 1853.

I WISH to draw your attention to a subject which affects our interests most materially. You may be aware that there has been a report recently presented to the Metropolitan Commissioners of Sewers on the subject of the drainage of the northern part of London, from west to east, by Mr. Bazalgette. This report proposes that the sewage of that portion of London be conveyed into the River Lea; the present sewer, called Hackney Brook, being made available, as a point of outfall, just above that point of the river where it has been ponded up by locks constructed in 1851. There is, further, a proposal in the report, to lead a branch from the point where the main sewer crosses Sir George Duckett's Canal to the Four Mills, lower down the river in Bow Creek. Our premises are situated at this lower point, and we are dependant upon the River Lea for the main part of our supply of water, the purity of which is of so great consequence, that for our more delicate operations, we are already compelled to apply to the East London Water Works, owing to the present increasing impurities of the river. We need not say that what has been hitherto a source of complaint and nuisance will, if this plan be adopted, become quite intolerable, and will render the carrying on of our business as distillers impossible. There are many other parties similarly situated with ourselves, particularly another distillery, Mure's, a short distance higher up the stream, who join with us in making this representation. There appears to be no very good reason for stopping short at the River Lea, and for not at once carrying the sewage of London into the River Thames at or near Barking Creek, crossing the Marshes, and entering the Thames at a distance from any houses or population. At this moment the Commissioners of Sewers for the level of Havering and Dagenham in Essex, are applying to Parliament for powers to enable them to construct a large system of sewage for Stratford, joining to the Victoria Dock Sewer, and having a common outfall in Gallions Reach. They propose to commence at a distance of half a mile eastward of the River Lea from Bow Bridge, and not more than a mile from the point where the Hackney Brook falls into it. It appears, that by combined operation, a more effectual plan of drainage might be immediately carried into effect at a diminished expense.

The Metropolitan Commissioners of Sewers profess it to be their intention eventually to extend their sewer in the direction and nearly to the same point which the Essex Commissioners and the Victoria Dock Company indicate in their plan; the latter Company being already compelled by their Act to make a sewer into Gallions Reach; so that by bringing all these parties into contribution, a complete scheme of sewage might be simultaneously carried into execution for the benefit of all parties, and without claim of compensation for any. There are many other points that might be urged, but having trespassed so long upon your patience, I will not bring them forward at present, but only beg to remain

Yours, &c.
(signed) *Leonard Currie.*

P. S.—I left the report of the Engineer of the Metropolitan Commissioners of Sewers at your house on Saturday. I have also a small map of the different branches of the Lea, if you should wish to see it.

No. 109.

H. Waddington, Esq., to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 17 December 1853.

I AM directed by Viscount Palmerston to transmit to you a letter from Mr. Alexander Campbell, enclosing a printed description of an apparatus for the construction of sewers, &c., which has been patented by Mr. A. Rogers, of Bradford, Yorkshire, and to inform you that Mr. Campbell has been requested to explain to you Mr. Rogers's plan for the ventilation of sewers.

32, Fore-street, London, 8 Dec. 1853.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 109.

To the Right Honourable Lord *Palmerston*, Her Majesty's Secretary of State for the Home Department.

My Lord, 32, Fore-street, London, 8 December 1853.

I HAVE the honour of enclosing, for your Lordship's consideration, the design and description of an apparatus by which to facilitate the construction of sewers, without incurring the danger to life, health and property consequent on the present practice of opening up streets, &c., for the formation of sewers.

I beg also to inform your Lordship, that Mr. Rogers being himself an old experienced miner and coal proprietor, he has been enabled to invent a most effective plan to ventilate sewers, mines or other subterraneous works, with little or no expense, and thereby prevent those gaseous exhalations which proceed from over-crowded human beings, or from decomposed substances, whether animal or vegetable, from destroying health or life.

Correspondence, &c.

The invention for ventilating sewers, &c., having only been registered a few days ago at the Patent Office, no drawing or description have yet been published; but I shall be happy to exhibit to your Lordship a small model, and give full and satisfactory explanations thereof to any parties your Lordship may appoint for that purpose.

I have, &c.
(signed) *Alexander Campbell.*

No. 110.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Metropolitan Commission of Sewers,
Sir, 1, Greek-street, Soho, 28 December 1853.

I HAVE the honour to acknowledge, pursuant to the instructions of the Metropolitan Commissioners of Sewers, the receipt of your letter of the 17th instant, transmitting, by direction of Viscount Palmerston, a copy of a communication from Sir William Clay, forwarding a letter addressed to him by Mr. L. Currie, of Bromley, Middlesex, on the subject of the proposed drainage of the northern part of the metropolis, as affecting his and other distilleries.

I am, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 111.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M.P.

My Lord, 1, Greek-street, Soho, 20 January 1854.

I BEG to remind your Lordship of the letter which, in conformity with the suggestion you made verbally on the 7th of December last to a deputation of the Metropolitan Commissioners of Sewers, I had the honour of addressing to your Lordship on the 14th of that month, asking the sanction of Her Majesty's Government to the commencement of certain main drainage works therein specified.

The several preliminary arrangements being now nearly completed, the Commissioners will very soon be in a situation to enter into a contract for the immediate execution of the first portion of the works in question; but their doing so must await your Lordship's answer to the letter above referred to, which I have now respectfully to solicit.

I have, &c.
(signed) *Richard Jebb.*

No. 112.

H. Waddington, Esq., to the Metropolitan Commissioners of Sewers.

Gentlemen, Whitehall, 31 January 1854.

I AM directed by Viscount Palmerston to transmit, for your consideration, the enclosed letter from Mr. William Austin, relative to his plan for a sub-way for main streets, &c., with sewage channel, &c.

7, Holywell-street, Westminster, 23 January 1854.

I am, &c.
(signed) *H. Waddington.*

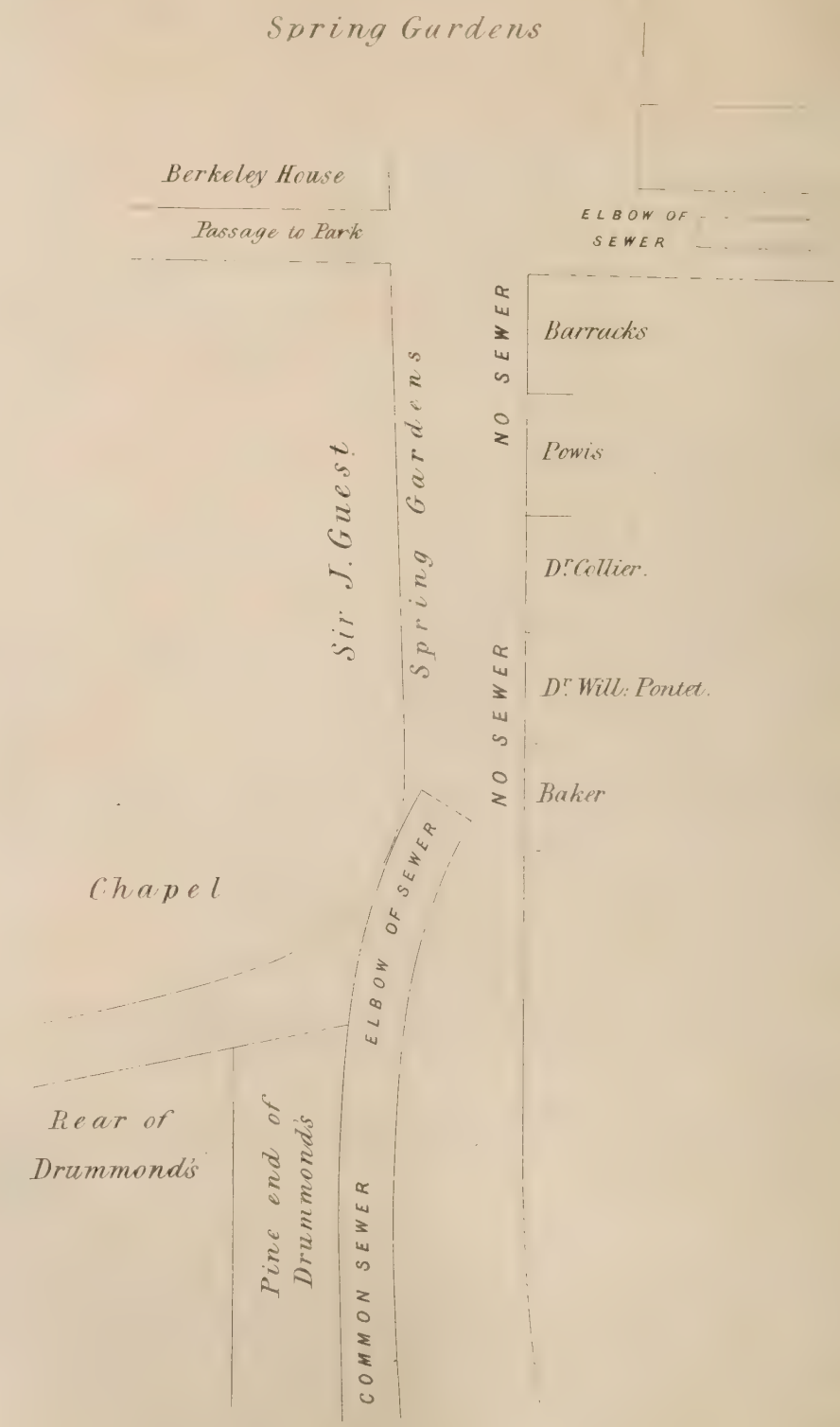
Enclosure with No. 112.

To the Right Honourable Viscount *Palmerston*, G.C.B., M.P., Secretary of State for the Home Department.

MAY it please your Lordship to permit me to introduce to your Lordship's notice, or that of any gentleman you may be pleased to appoint, to inspect my plans, sections and models, for a complete and effective sub-way for main streets, &c., combining a sewage channel, with ample spaces for flooding from thunder-storms, and for the escape or discharge of such flood or storm waters, keeping the heavy foul sewage in its proper channel; and finally discharging it into the Thames, at such a distance from the metropolis, that the retreating tide would not bring back the sewage matter far enough to affect the purity of the natural stream or waters of the river. There can be no doubt, however, that a large portion of the sewage might be raised at its outlet for manuring purposes, possessing high fertilising powers, for producing crops from present waste and common lands, and eventually bringing in a large commercial revenue.

Above the sewage portion, I propose a sub-way, or road under the streets, for heavy goods traffic on tram-ways for railway carriages, street carts, waggons, &c. &c.; which arrangement

(To face page 155.)



Day & Son Lith^rs to the Queen. Henry Hansard, Printer

N°. 180. Ordered, by The House of Commons, to be Printed, 11th April 1854.

arrangement would remove the present evil of constant obstructions in our streets, and permit a quick transit of passenger and other light vehicles.

My plan also shows the capability of placing all the pipes for gas, water, telegraph, &c., on cross girders or beams of iron, in the sub-way, over the road tracts, instead of burying them in the ground, so as to obviate the present wretched system of continually breaking up the streets, to lay new, repair old, and attach service-pipes, &c.

The whole sub-way is proposed to be lighted with gas, well ventilated and under surveillance of inspectors, to prevent accidents, or escapes of gas, water, &c., from the pipes.

Trusting I have stated sufficient to induce your Lordship to consider the subject of application worthy your Lordship's notice, attention and influence,

I have, &c.

27, Holywell-street, Westminster, (signed) *William Austin.*
23 January 1854.

No. 113.

R. W. Grey, Esq., to *R. Jebb*, Esq.

My dear Sir, Whitehall, 6 February 1854.

I SEND you Dr. Collier's letter, to which it appears no answer is required.

Yours truly,
(signed) *R. W. Grey.*

Enclosure with No. 113.

(*In Re* Common Sewers.)

My Lord, 32, Spring Gardens, 6 February 1854.

I SUPPLY you with a fact, which, if new to you, must be a startling one.—(No answer needed.)

In the street called Spring Gardens, where I have resided and paid sewers rates 30 years, in the so-called "Verge of the Palaces." there is not, and never has been, any common sewer whatever.—(*Vide* the Sewers' Map.)

We have cesspools and barrel drains, and I have repeatedly seen the latter broken through by rats, and an overflow, occupying the whole level of the kitchens below boards.—(*Vide* Plan annexed.)

Neither the late Dr. Meton nor myself could ever accomplish the improvement.

Yours, &c.

To Secretary of State, &c. (signed) *Geo. F. Collier.*

Note.—To show the patient submission of the inhabitants, it may be stated, that they pay, on average, 6*l.* or 7*l.* every seven years for night emptying, and also have paid sewers rates from the commencement of the operation of the Sewers Act. There is a sewer leading from Pine end of Drummond's, round to the rear passing on to New-street, with an elbow only at the embouchure of our street.

No. 114.

H. Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 17 February 1854.

I AM directed by Viscount Palmerston to transmit to you the enclosed letter from Mr. John Hudleston, complaining respecting a sewer at Holloway from which there is no outlet. Holloway. Feb. 14.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 114.

My Lord,

I AM a medical practitioner of just now 20 years' standing in this place, and as such, most earnestly solicit your interference to cause the removal of what may shortly affect the health and lives of those around me.

I reside in Cornwall-place, Holloway, through which one main sewer runs from the intended New Market to the Holloway Road. Another from the same place comes down a parallel street, called St. James's Road, along a portion of the Liverpool Road, into the High Road, and joins it at a right angle at the bottom of Cornwall-place; the two thus united then proceed to a point about 60 or 70 yards northward, and end in a *cul de sac.* The drains and privies that have been joined to these chief sewers, from which there is no outlet, all empty their contents into them; the consequence is, there is a large subterraneous lake of fœtid water, feculent matter and noxious gases. This has remained a long time; nor does it appear any step is taking, or likely to be taken, to remedy the evil. The exit

Correspondence, &c.

is, or was intended to have been, into an open ditch near the Great Northern Railway, which itself ought long since to have been done away, and against which, in the present state of the ditch, I strongly protest. The sewer is made lower than its level, and were it not so, the contents of the ditch run at a rate scarcely perceptible for a mile; nor does its current quicken materially until it comes to and turns abruptly into Hackney Fields. It is to be feared a plague of a deadly character is at our very doors, and only awaiting a change in the season to develope itself. I do, therefore, again most imploringly and emphatically request your assistance to secure,—First. That the Commissioners or whom it may concern, shall daily be compelled to pump out this subnatant fluid; and, 'Second. That the sewer shall not be used for general purposes until it has been well and properly completed in its whole course.

I am, &c.

Holloway, 14 February 1854. (signed) *John N. Hudleston.*

To Lord Palmerston.

No. 115.

H. Fitzroy, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 18 February 1854.

17, Stratford-place, 17 Feb.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a letter from Mr. F. O. Ward, relative to the comparative advantage of the systems of drainage advocated by the Commissioners of Sewers and the Board of Health respectively; and I am to state that in his Lordship's opinion the system of drainage recommended by the Board of Health is that which ought to be adopted, as combining the greatest degree of efficiency with the greatest degree of economy.

I am, &c.

(signed) *Henry Fitzroy.*

Enclosure with No. 115.

My Lord, 17, Stratford-place, Oxford-street, 17 February 1854.

THE Commissioners of Sewers and the Board of Health are at issue as to the cheapest and best way of draining houses.

The Board of Health advocate the drainage of each house block by a tubular sub-main running behind the houses, and receiving the sewage of each by a short tubular branch. They recommend a large reduction of the sizes of drains hitherto employed for the single house drain; they recommend a 4-inch pipe for the sub-main, receiving several of these, a 6-inch, gradually expanding to 9, 12, and so on, up to 20 inches, as the length of the sub-main and the number of branches received by it increase. Such drains, they say, are self-scouring; the run of water through them is so concentrated that it keeps them clear of deposit; the branches being very short, and running backward towards the drain behind, instead of forward, beneath the houses towards a sewer in the street, have a quicker fall, and in case of leakage, leak into the open air, not into the houses; while the cost is so much reduced by this method, that blocks of labourers' houses may be thoroughly drained and fitted with sinks and soil-pans for an improvement rate of less than 2*d.* per house per week.

The Commissioners of Sewers, on the contrary, recommend large brick sewers under the street in front of the houses, beneath each of which they carry a long drain from back to front, strictly forbidding more than two houses being relieved by one pipe-drain; a system which (whether otherwise good or not) certainly entails an enormous increase of expense on the house owners, and thereby redoubles the resistance on their part to sanitary improvement.

The Commissioners of Sewers lay great stress on the independence secured by their system to each house owner, whose premises are traversed by his own drain only, which he may take care of or neglect as he pleases, as its stoppage can only injure himself. They allege against the Board of Health plan, that it trespasses on private property; that any stoppage of the tubular sub-main exposes all the houses higher up to suffer, and renders it necessary for workmen to enter private back-yards to search out and remedy the evil. They also deny the self-scouring property of the tubular sub-mains, and refer, in support of their view, to several hundred cases of stoppages in tubular drains, collected in a report of Mr. Bazalgette.

The Board of Health, on the other hand, declare the householders pretended "independence" on this plan to be illusory, seeing that the big street sewer is nine times in ten an elongated cesspool, where the sewage of each stagnates to the detriment of all; while the stoppage of a branch drain running beneath a house on the old plan often causes stench in the houses on either side. Against the inconvenience of an occasional invasion of the back-yards by workmen, they set the greater inconvenience of periodical invasions of the street and stoppage of the traffic, besides tearings-up of kitchen floors to get at foul drains under the houses. In reply to Bazalgette's Report, they bring forward examples by hundreds of pipe-sewers working admirably year after year, and attribute such stoppages as have occurred to errors incidental to the first introduction of a new system, errors,—which once known, may be avoided. Amongst these, they cite the use at first starting of drain pipes, which were too

too thin, so that they broke under the pressure of superincumbent earth, the uneven laying and careless jointing of pipes by the jobbing builders often employed (as in some parts of Croydon) on this work, the use of soil-pans with *interi* as large as the pipe-drains to which they led, and above all, the often scanty and intermittent supply of water to the system. They further point out, that a population accustomed to open privies and cesspools available as receptacles for solid refuse of every kind (refuse properly due to the ashpit) have to go through a transitional period of a few weeks, while they are learning that such practice leads to the stoppage of the new circulating system, and must be abolished along with the old stagnant cesspools. They say that many of the tubular sewers put down as failures in Bazalgette's Report are at this moment working perfectly well, for which reason they take all his allegations with very great reserve. They point, with some reason, to Lambeth-square, New Cut, where the Commissioners have allowed 32 houses to be drained by four tubular back drains, which act perfectly well, quite as well as 32 separate drains could act, though these would have cost eight times as much; and they ask why this eight-fold cost should be imposed upon London at large, by the very same authority which sanctioned, in this square, the combined drainage, which is found to work well.

The controversy is of immense importance, but I forbear further to trespass to-day on your Lordship's time.

I am, &c.
(signed) *F. O. Ward.*

No. 116.

E. H. Woolrych, Esq., to the Honourable *H. Fitzroy*, M. P.

Sir, 1, Greek-street, Soho, 22 February 1854.

I BEG to acknowledge the receipt of your letter, dated the 18th instant, transmitting the copy of a letter from Mr. F. O. Ward, relative to the comparative advantage of the systems of drainage advocated by the Commissioners of Sewers and the Board of Health, and to state that those communications shall be laid before the Metropolitan Commissioners of Sewers at their next meeting.

I have, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 117.

R. Jebb, Esq., to the Right Honourable Viscount *Palmerston*, M. P.

My Lord, 1, Greek-street, Soho, 27 February 1854.

I HAVE the honour to transmit copies in duplicate of the reports of Mr. Bazalgette, engineer to the Metropolitan Commissioners of Sewers, and Mr. Haywood, engineer to the City Commissioners, upon the sewage interception and main drainage of the districts north of the Thames; also a copy of the report of Sir William Cubitt thereon.* These reports were presented to a Court of Sewers held this day, at which the City members of the Commission were present. Mr. Stephenson is now abroad; but his return to England being daily expected, an early opportunity will probably be afforded of obtaining his opinion upon those portions which are new of the scheme propounded in the reports.

No. 1.

No. 2.

I would beg to suggest to your Lordship the expediency of laying before Parliament these reports, and also the reports of October last, already presented to your Lordship, of which I now transmit additional copies in duplicate.

No. 3.

I have, &c.
(signed) *Richard Jebb.*

No. 118.

R. Jebb, Esq., to Viscount *Palmerston*, M. P.

My Lord, 1, Greek-street, Soho, 28 February 1854.

I HAVE the honour to transmit to your Lordship a copy of Mr. Wicksteed's Report upon the most advantageous mode of dealing with the sewage matter of the metropolis; and I beg to request your Lordship to lay the same before Parliament.

I have, &c.
(signed) *Richard Jebb.*

Enclosure

* These documents are included in the papers referred to in the Note to No. 66, as having been printed by order of the House of Commons.

Correspondence, &c.

Enclosure with No. 118.

REPORT of *Thomas Wicksteed*, Civil Engineer, "upon the most advantageous Mode of dealing with the Sewage Matter of the Metropolis, with a view to the Preparation of Sewage Manure."

To the Honourable the Metropolitan Commissioners of Sewers.

Gentlemen, 40, Coleman-street, City, London.

BEFORE requesting your attention to the Report, which you have done me the honour to ask for, I beg leave to call to your recollection the instructions you have favoured me with, conveyed to me in letters and documents received from your secretary, of which the following are copies:—

No. 1.—A LETTER from your Secretary, dated 24 November 1853.

"I AM directed by the Metropolitan Commissioners of Sewers to inform you, that they are engaged in considering the most advantageous mode of dealing with the sewage matter of the metropolis, with a view to the preparation of sewage manure; and as they are aware you have directed much time and attention to the inquiry, they desire me to ask of you whether you would be disposed to favour them professionally with information, obtained in the course of your experience, on the subject, which you may deem useful, and if so, to propose Tuesday next, the 29th instant, at 12 o'clock, at this office, for an interview."

In compliance with this request, I attended a meeting of the Commissioners at the time appointed, and was made acquainted generally with the objects they had in view in asking for my opinion, and was requested to confer with Mr. Bazalgette and Mr. Haywood as to the precise instructions and information I should require to enable me to comply with the wishes of the Commissioners. I did so accordingly, and afterwards received the following:—

No. 2.—A LETTER from your Secretary, dated 8 December 1853.

"I BEG to transmit to you, pursuant to the directions of the Metropolitan Commissioners of Sewers, the accompanying copy of the Instructions prepared by their engineer, Mr. Bazalgette, and approved by them, from which you will collect the particular points to which the Commissioners are desirous that your attention should be directed in the Report which you are about to prepare for their information. The materials to be supplied to you, as described in the concluding part of the instructions, shall be at once prepared, and supplied to you as soon as they are ready.

"INSTRUCTIONS for Mr. *Wicksteed.*

"That Mr. Wicksteed be requested to report generally as to the information obtained in the course of his experience on the subject of dealing with the sewage matters of towns by converting the same into solid manure, or otherwise disposing of it, and particularly as to the extent of deodorisation and purification of the sewage water effected by the processes, the actual commercial value of the residual manure, and as to the practicability of constructing sewage manure works, without causing in any degree nuisance in their vicinity.

"That he be requested specially to report as to the expediency of placing works for the manufacture of the sewage water into solid manure, solely at the outlets of the intercepting sewers proposed for each side of the river, or at intermediate stations, and as to what, in his opinion, would be the maximum and minimum sizes of works, considered in relation to the extent of population, which, in a sanitary and economical point of view, might be established for the manufacture into solid manure of the sewage waters of the metropolis.

"That he be requested further to report whether, with existing information as to the value of sewage water, a company would guarantee to the public the conversion of the whole of the metropolitan sewage into manure.

"That, for the purpose of enabling him well to consider the question, he be supplied with a plan, showing the proposed lines of intercepting sewers, the position and height of the lifts, and information as to the amount of sewage likely to be carried off by them, and also with the situations which suggest themselves as suitable for the establishment of sewage manure works."

Upon the 17th of December I received from Mr. Bazalgette a map, exhibiting a general view of the main sewers for the northern drainage, with the following information from Messrs. Bazalgette and Haywood:—

No. 3.—From Mr. *Bazalgette*, dated 16 December 1853.

"THE main sewers of the eastern division are capable of being terminated at the points A., B. and D., at the River Lea, and their contents being separately or collectively manufactured into manure in that locality; or they can be continued so as to discharge at mean high-water at the mouth of the Roding. With this view, A. and B. will be nine feet above Trinity high-water at crossing over the River Lea, and the sewage could possibly be there converted into manure without pumping.

"The main sewers of the western division will have two separate flood outlets into the river at the points E. and I., the inverts being there level with low-water.

"Sewage

"Sewage manure works could be established at both those points, or the sewers could be connected, so as to have one establishment.

"We have taken the sewage at five cubic feet per head, and the Tables give the sewage thus due to the present population, and also due to the ultimate increase of population as estimated by us."

NORTHERN SEWAGE INTERCEPTION AND DRAINAGE.

		Present Population.		Prospective Population.	
		Cub. Ft. per Diem.	Cub. Ft. per Min.	Cub. Ft. per Diem.	Cub. Ft. per Min.
Hackney Brook - -	A.	462,240	321	2,075,040	1,441
Middle Level - - -	B.	3,911,040	2,716	4,574,880	3,177
Low Level - - -	C.	3,225,600	2,240	3,415,680	2,372
TOTAL - -	D.	7,598,880	5,277	10,065,600	6,990

WESTERN DIVISION.

Acton Line - - -	E.	169,920	118	662,400	460
Cheyne Walk, Branch to ditto	F.	224,640	156	224,640	156
Brentford Line - -	G.	298,080	207	1,732,320	1,203
Fulham, Branch to ditto -	H.	37,440	26	139,680	97
TOTAL - -	I.	730,080	507	2,759,040	1,916

"*Memoranda.*—The height of the lift, from the invert of the low level sewer at the pumping station near West Ham Abbey, to the invert of the high level sewer, is 35 feet, and to Trinity high-water mark 26 feet.

"The height of the lift from the invert of the sewer at the pumping station in Fulham Meadows to Trinity high-water mark is 17½ feet."

Upon the 22d of December I received a copy of the map of the southern drainage, with the published reports of your engineers.

I have much pleasure in acknowledging the facilities that have been afforded by Mr. Bazalgette, your engineer, and Mr. Haywood, the engineer to the City Commissioners of Sewers, by promptly supplying me with the necessary plans and information; an assistance, the value of which can only be fully appreciated by those who, like myself, have not unfrequently felt its want.

At the request of the engineers, I propose to make an appendix to my report, in which more detailed information will be afforded than could be conveniently introduced into the report itself.

In the report, to which I now beg leave to call your attention, I have endeavoured to fulfil the foregoing instructions as far as practicable.

REPORT.

I am requested to Report,—First,

"Generally, as to the information obtained in the course of my experience on the subject of dealing with the sewage matters of towns, by converting the same into solid manure, or otherwise disposing of it."

It will probably be considered useless to adduce any additional evidence to that already obtained to prove that the sewage water of towns contains much valuable fertilising matter, as, the fact that it does so, is now, I believe, universally admitted; and that its value is not attributable solely to its containing urine and excrementitious matter in a state of dilution, but also to other ingredients from dye-works and manufactories, producing refuse of animal and vegetable matter; and the ammoniacal refuse from gas-works also adds to its value.

It is well known that urine and excrementitious matter, where it can be collected separately, and properly diluted in farm-yard tanks, its strength being proportioned to the crops for which it may be required, is far superior, quantity for quantity, to the contents of town sewers generally; but the sewers of a manufacturing town will contain larger quantities of refuse from manufactories, in proportion to the whole quantity of sewage water, than of refuse from water closets.

It is also well known that the application of manure to crops in a liquid form is in a great many instances more advantageous than when used in a solid form, especially when applied

Correspondence, &c.

to green crops. The question, however, of the amount of dilution in the liquid form has either been blinked, or has had too little importance attached to it; and thus the term "liquid manure" has been used indiscriminately, not only to represent that collected in farm-yard tanks, but also that obtained from the sewers of towns, in which the supply of water being deficient, the dilution has not been great; and again, to the sewage water of the metropolis and other large towns, where the dilution, as compared with the other two cases, may (not unfairly) be termed excessive, being probably six or seven times greater; but to those unacquainted with such facts, the indiscriminate use of the term creates the idea that all liquid manures are equal in value; and hence the statements that have been published as to the very beneficial results of the application of liquid manure should be received with great caution, however truthful the individual statements may be.

There can be no doubt that the flood waters supplied from a district, the land of which is chiefly arable, will produce a much more beneficial effect upon green crops than those from a barren or mining district. In the latter case it may be positively injurious. There can also be no doubt that the beneficial effect produced in the first case arises chiefly from the fact of the waters containing the manure that has been washed off the arable lands during the progress of the flood; and I should imagine there could be as little doubt that the quantum of benefit derived from the application of these waters must in a great measure be in proportion to the solid contents of the fertilizing matter with which they are impregnated.

It would, therefore, appear evident that any comparison made between the liquid manure used by the German farmers, that used by the proprietors of the Edinburgh Meadows, and others, the beneficial results of which have been published, and the sewer water of the Metropolis, or that of New York, where the supply of water is now reported to amount to 90 gallons per head per diem, and those large towns in Great Britain, where abundant supplies of water are now afforded, could only lead to error, unless the actual amount of solid fertilising matter contained in each water be first ascertained.

Nevertheless, with all this knowledge upon the subject, the difficulty of applying the sewage water of large towns in a liquid form, so as to produce a commercial benefit, has not been overcome; and the additional experience I have obtained since 1845, induces me to adhere to the opinion I then expressed; namely, that the "difficulties are insuperable."

Nevertheless there are many very intelligent agriculturists, who, it may be assumed, from various publications of their opinions, still consider the distribution of the sewage of towns through pipes by the application of steam power as the only legitimate method of disposing of it; but I imagine they have been misled by the publications or advice of engineers, as to the practicability, not to say ease, of distributing large quantities of water over a wide extent of surface, and the consequent economy of such a mode of applying it.

It may, perhaps, be as well to consider the principles which necessarily limit the application of this proposed system; and for the purpose of elucidation, I will suppose the case of a town but very moderately supplied with water, in which the sewage is comparatively strong, but in which the supply of water afterwards becomes abundant, so that there shall be four times the quantity of water passing through the sewers, and thus diluting their contents four times. I will also suppose that a system of mains and services had been laid over a large tract of land in the neighbourhood for the purpose of conveying and distributing the sewage water of the town before the accession of this additional supply of water; that an engine of 100 horse-power had been erected for raising and distributing the sewage; and that one-tenth of this power had been required to raise the water from the bottom of the sewers to a height of 10 feet above the level of the neighbouring river; and that the remaining nine-tenths, or 90 horse-power had been required, partly for overcoming the friction created by the passage of the water through the system of pipage, and partly to provide for sufficient pressure to distribute the water in jets over the land.

That the cost for distributing the comparatively strong sewage water upon this system had been such, that the revenue derived from the sale of the sewage water had so far exceeded the working expenses as to make it a profitable undertaking.

Now, as the improved supply of water would gradually increase the quantity of the sewage water to double, treble or four times the original quantity, the capacity of the mains and works must also be increased, either by adding to the number of engines and mains in proportion to the increased quantity of water, or if the pipes are not increased in number or size, the steam-power must be increased, first to lift the increased quantity; and in this instance the increase of power will be in direct proportion to the increase of quantity, or from 10 to 20, 30 or 40 horses-power; and secondly, to overcome the increased friction caused by the larger quantity of water passing through the same pipes; but for this purpose it is a well-known fact, open to proof, in any waterworks in the kingdom, that the power required for this purpose must be increased, not in direct proportion to the quantity as in the first instance, but in the proportion of the squares of the quantity, or, which is the same thing, as the square of the velocity. The power, therefore, in the second instance, would have to be increased from 90 to 360, to 810, or to 1,440 horses-power, which latter would be for four times the required quantity, instead of from 10 to 20, 30 and 40 horses-power, required for merely raising the water a given height without distributing it; and in my opinion this principle has been too frequently overlooked, although it may, in fact, limit the application of the system.

But this increase of water involves also a commercial disadvantage, for its value would be reduced in inverse proportion to the cost of distribution, or in other words, while the capital and annual expenses might have to be increased four times only, the revenue would be reduced to one-fourth; every ton of the increased quantity of sewer water containing only one-fourth of the fertilising matter it originally contained.

There

There is, however, another point of no mean importance to be taken into account in the consideration of this question; for, supposing a company to be actually formed for the disposal of the sewage in this manner, it will readily be admitted that the interests of the two bodies, the Commissioners on the one hand, and the company on the other, should be as nearly as possible identical, that the public might derive the advantages they have a right to claim from such an arrangement; but I think it will appear that, on the contrary, their interests would be antagonistic.

I think it cannot be doubted that the objects sought by the Commissioners, as representatives of the public, would be, first to dilute the sewage in its passage from the houses, and while it remained in the sewers under the town, as much as possible, as it is well known that the noxious effect of sewage is much increased by concentration; and to effect this dilution, it would, therefore, obviously be a chief object with the Commissioners to encourage an abundant supply of water; and, secondly, that no sewage water should be discharged into the river of a town, unless previously deprived of its noxious qualities. In arranging, therefore, with such a company, the Commissioners would imperatively require that the whole of the sewage water should be removed to a distance from the town as rapidly as it was supplied by the sewers.

On the other hand, it can hardly be doubted that the company would do all that they could to prevent an increased supply of water to the town, simply because their property would be much reduced in value by the greater dilution of the sewage water; and if they could not offer any effectual obstruction to such a proceeding, they would naturally endeavour to lessen their losses, either by avoiding as far as possible the erection of additional works, or by conveying a portion only of the sewage water from the town.

The probable result, however, would be, that the company would be ruined, and that the Commissioners would have to look out for some other means of disposing of the sewage water.

If the object of this report was solely to enable the Commissioners themselves to arrive at a conclusion as to the best mode of disposing of the sewage water of the Metropolis, it would probably be considered that I had already said more than was necessary upon this portion of the subject; but as I am informed that the Commissioners wish to enable others, who have not the opportunity of their experience, to satisfy themselves as to the feasibility of the plans that have been proposed for the disposal of the sewage water of the Metropolis, and as the public are told, on the one hand, by unprofessional parties, that the time will come when every railroad will have a large iron tunnel running under or alongside it, for the purpose of distributing the sewage water of towns over the agricultural districts; while, on the other, professional men publish statements of the economic advantages of such a system, based upon imperfect practical experience and data, by far too confined to warrant its adoption on a large scale, I may perhaps be permitted to make some further observations before quitting this part of the subject.

To enable me to comply as strictly as possible with your instructions, and as the adoption of any particular plan must at last depend upon its being capable of producing commercially a beneficial effect, I have endeavoured to make an estimate of the cost of conveying the sewer water of the Metropolis to, and distributing it over, agricultural districts; and although I have arrived at an estimate which will be sufficiently large, I imagine, to settle the commercial question, I can only consider this amount as a portion of what the ultimate cost might be in carrying out a scheme which, after an examination of the following statements, you will probably agree with me in terming purely chimerical.

The population of the Metropolis, according to the last census, amounted to 2,362,236; the increase from 1831 to 1841 was at the rate of 17$\frac{3}{4}$ per cent., and from 1841 to 1851 at the rate of 21$\frac{1}{4}$ per cent.; and supposing the increase in the next 10 years to be at the rate of 20 per cent., in 1861 it will amount to 2,834,683.

From the vast increase in the supply of water which is rapidly taking place, I consider that 36 gallons, or rather more than 5$\frac{3}{4}$ cube feet per individual per diem, would be a fair amount to estimate upon for the future.

At this rate, the daily quantity of sewage water will amount to 102,048,588 gallons per diem, or 166,719,190 tons per annum.

According to the analysis of the eminent chemists, Professor Brande and Mr. John Thomas Cooper, 150 tons of sewer water from King's Scholars Pond Sewer contained 1-500th part, or six cwt., of solid matter, which may be considered a sufficient average quantity for an acre of ground per annum: the solid matter contained in 166,719,190 tons of sewer water will therefore be equal to 6,668,760 cwt., which at six cwt. per acre will supply an area of 1,111,460 acres.

The extent of district to consume this quantity will be rather more than double, or 3,500 square miles, equal to a circle of 66$\frac{1}{2}$ miles in diameter; the main pipage required will be equal to 1,236 miles, varying in diameter from 38 inches to 12 inches.

The steam power required will be equal to 16,152 horses working under a pressure equal to a column of water of 500 feet.

The capital required will amount to nearly 12,000,000 *l.* sterling.

The quantity of coals required per annum will be about 170,000 tons.

The annual cost for coals, labour, stores, and repairs for engines and buildings will amount to about 240,000 *l.* sterling.

Supposing 10 per cent. upon the capital to be sufficient to cover all disbursements, including five or six per cent. interest upon capital, this will amount to 1,200,000 *l.* per annum, which for 333,438 tons of solid matter (*vide* Appendix) will give a cost of 3 *l.* 11 *s.* 9 *d.* per ton.

Correspondence, &c.

A detailed calculation will be given in the Appendix, but the foregoing will perhaps be sufficient to convince the Commissioners that the liquid scheme, even if it could be carried out as herein proposed, is not a feasible one; but when in addition to what has been stated, it is borne in mind that the basis upon which the calculation rests is upon the assumption, first, that the whole of the sewage water could be collected in one central spot; secondly, that twelve 38-inch radial pipes could be laid in straight lines from the central point; thirdly, that the circle of 66½ miles in diameter round the Metropolis is a flat plain, and that the Surrey hills on the south, and the Middlesex and Hertfordshire hills on the north, do not exist; fourthly, that a sufficient number of landed proprietors could be found within the proposed extent of district to use so large a quantity of one kind of manure, and as the supply must be constant, to construct covered reservoirs on their lands to hold the supply during such periods, as it is not being actually poured upon the land; and unless these, to me, impossible conditions can be complied with, the estimate for 12,000,000*l.* will be found much too small. I think the Commissioners will agree with me, that such a scheme for the disposal of the sewage water of the Metropolis should not be entertained.

Having, years ago, as before mentioned, formed the opinion, that however valuable the application of liquid manure to land might be, and however economically and profitably it might be supplied on a small scale, that upon the large scale it was in effect commercially impracticable, I turned my attention to the application of it in a different form, and I will now proceed to give the Commissioners such information as my experience enables me to do as to the feasibility of extracting from the sewage water fertilising matter in a solid form.

The real difficulty that has existed with reference to most of the schemes proposed for the disposal of the sewage has been that of dealing with large quantities. A scheme may be a very good one, and based upon right principles, and may be carried out effectually and profitably upon the small scale; but, as has been shown in the case of the liquid scheme, the difficulties that present themselves to carrying it out upon the large scale are frequently insuperable, and a scheme that might answer remarkably well for each of a hundred small towns would be commercially impracticable if applied to one town having a population equal to the aggregate population of the hundred small towns; for example, the plan that has been proposed for filtering sewer water through a charcoal medium would be good, inasmuch as the charcoal would absorb a great deal of fertilising matter, and is at the same time a good deodorant. Now, taking a population of 5,000, and assuming the supply of sewer water to be equal to 36 gallons per head per diem, or 5,776 cubic feet, this would be equal to 180,000 gallons per diem: and supposing three-fourths of this to be supplied in 12 hours of the day, it would be equal to 135,000, or 187½ gallons per minute. Now, for the perfect filtration of ordinary river water, such as the Thames or the Lea, it requires two square yards of filtering surface to clear one gallon per minute; but for extraordinary water, such as is found in the river Clyde in certain seasons of the year, and which is discoloured by vegetable matter, it requires 5½ square yards of filtering surface to render the water colourless; but taking the two square yards as being sufficient for the sewage, it would require a filtering bed of 375 square yards, or rather less than one-twelfth of an acre, to clear this quantity of water. Such would be the size for a small town; but taking the Metropolis, as before estimated, at 17,057 cubic feet, or 106,299 gallons per minute, it would require a filter bed of 44 acres area, or 1,383 feet square. Such a plan, therefore, supposing it to be in other respects eligible, however suitable for a small town, would probably be deemed inapplicable to the Metropolis.

It will perhaps be readily admitted that any plan proposed for the disposal of the sewage of the Metropolis, or any other town, should be subject to two conditions: first, that the sewage water, before exposure to the open air, should be thoroughly disinfected; and secondly, that the residue, or noxious matter which is taken from it, should not only be converted into a source of profit, but that the operations required to produce this conversion should be such that no nuisance may arise therefrom in the neighbourhood.

If the water is merely deodorized, and the precipitate matter is left to accumulate, it will not only require reservoirs of very great area, but when the supernatant water is drawn off, and the mud at the bottom has to be removed (as it must be periodically), its removal will not only be expensive, but, from the large extent of surface that must necessarily be exposed, it might become a source of serious nuisance, at the same time that the separation of those gases which exhale and cause the nuisance would reduce *pro tanto* the fertilising value of the deposit. Hence it is obvious that such reservoirs would have to be constructed at a considerable distance from the habitable portions of the Metropolis.

But when, in 1845, I proposed to construct similar reservoirs at Barking Creek and the Greenwich Marshes, my object in proposing outfalls so distant from the Metropolis, was rather with a view of conciliating the then popular prejudices, than from a belief that the works themselves, if brought any nearer to London, would have been in any way prejudicial to the surrounding neighbourhood; for I had at that time ascertained the effect of the action of lime upon sewer water, and finding that the water was completely deodorised, I assumed that the precipitate would be equally so; but subsequent experience has proved to me that when large surfaces of the wet mud at the bottom of a reservoir are exposed by the removal of the supernatant liquor, the smell arising from it is unpleasant, although, I believe, perfectly innoxious; and as this smell is produced by the evaporation of the fertilising ingredients, as before observed, it became an all-important matter, in a commercial point of view, to avoid unnecessary exposure, and I believe, by the process I now adopt, and which will be explained hereinafter, the object has been fully attained.

Being now about to describe the plan of dealing with the sewage matter of towns recommended

mended by me as the result of my experience, and as, with one exception, I am personally unknown to the Commissioners, it may be desirable that I should give a short statement of the progress of my investigations with regard to sewers and sewage up to the present time.

In 1841, I was called upon to report as to a system of sewerage for the city of Berlin. The difficulty to be overcome was the insufficiency of the natural outfall, and this difficulty was considered to be so great, that the idea of sewering the city had been almost abandoned, when Major Bueyer, the King's Commissioner, consulted me as to the possibility of overcoming the impediment. I recommended the adoption of an artificial fall, or, in other words, that a well or shaft should be sunk outside the city, to a depth sufficient to allow of an ample fall for the drainage of the city; that the low level of the surface-water in this well should be maintained by the application of pumping engines; and that the liquid sewage should be distributed over the land in the immediate neighbourhood of the city, which he represented to me as being to a great extent arid and barren. I am not aware that any similar plan had been previously suggested.

It was also intended to give an ample supply of water to the city. This of itself would have much decreased the noxious effects of the sewers, and the rapid removal of the sewage, together with its dilution, would have rendered the distribution of it over the neighbouring lands a very important improvement on the existing state of things, under which the sewage, in a highly concentrated state, was allowed to remain in close proximity with the dwellings of the inhabitants.

The fortuitous circumstance of a large extent of barren land being in the neighbourhood would have rendered a scheme for the distribution, by means of pipes, more feasible than it otherwise would have been, but I did not make any calculation of the expenses of such distribution, as at that time it was considered a matter of more importance to improve the sanitary condition of the city than to obtain a profit by the sale of fertilising matter; and had after experience proved that the scheme for improving this barren land would not be commercially beneficial, the sewage water might have been raised and discharged into the river at a sufficient distance to ensure the salubrity of the city.

In 1845, I was called upon by the projectors of the London Sewage Company to report to them upon the practicability of carrying out a scheme for distributing the sewage water of London in agricultural districts by the application of steam power and pipes, and was further instructed, that if I found it could not be carried out thus, so as to prove profitable, to suggest, if possible, some other mode for effecting the object; and it was at that period that I entered into the calculations as to the cost of such a scheme which led me to form the opinion that it could never be made a remunerative speculation. I then considered a scheme for arresting the fertilising matter held in suspension in sewer water, and found that even had it been as valuable as the matter held in solution (which is by no means the case), the quantity to be obtained, having regard to its quality, was too small to be remunerative.

It then occurred to me that if, by a mode much less costly than that of evaporation to dryness, a sufficient quantity of the fertilising matter held in solution could be separated, that the collection and extraction of fertilising matter from sewer water might then be effected at a remunerative cost, or otherwise the scheme must be abandoned.

I then consulted my friend, Mr. Arthur Aikin, the eminent chemist, at that time professor of chemistry at Guy's Hospital, as to whether there was any cheap substance that could be employed to separate the fertilising matter dissolved in sewer water, and which would not itself prove injurious to the manure, and he informed me that he had, for forty years previously, been in the habit of using a small quantity of lime to separate the organic matter contained in the New River water; which application had always effected its intended purpose, and that he had no doubt it might be applied with good effect to the sewer water. Mr. Aikin tried some experiments upon the London sewage water, and found that by the addition of about the three-thousandth part by weight of lime, the quantity of precipitate obtained was double of that which had previously resulted from the precipitation of the solid matter only, held by mechanical suspension in the sewer water; the result of these experiments showing that not only was the weight of the manure to be obtained doubled, but that the addition being much more valuable as a fertiliser, the whole quantity was rendered superior, and it appeared to be very probable that a remunerative scheme might be formed. Accordingly, I designed a plan for the projector of the London Sewage Company, and plans were prepared and deposited for Parliament, and the same was done in the following year; but at neither of the periods could the company proceed for want of the necessary capital.

For some time after that period the state of the money market was such that, although various similar schemes were published for tunnel sewers with artificial falls, I considered my scheme would not be much advanced by bringing it in opposition to the new schemes until there was a greater chance of being able to raise capital for its execution.

About the year 1849 I consulted my friend, Mr. Robert Stephenson, upon the subject, who was kind enough to enter into a thorough investigation of my scheme, and an examination of the data upon which it was founded; he afterwards expressed a favourable opinion of its feasibility. The objections to it he considered to be chiefly the large size of the reservors, which we agreed it would be desirable to reduce, if a scheme for so doing could be devised. And as to the question of the tunnel sewer itself being constructed by a private company instead of by a public commission, as it is clear that the company's interest would be to make the sewer as little in excess of the size required to convey the sewer water, when sufficiently impregnated with fertilising matter to render its extraction remunerative, while a commission, not being swayed by such considerations, would naturally consider the ques-

Correspondence, &c.

tion of getting rid of flood waters also; he thought, therefore, that it would be better, if possible, to divide the scheme, leaving the sewer to the public Commission, and the process of disinfecting and utilising the sewage water to a company. Thus encouraged, I proceeded farther in the consideration of the subject. And in the following year the idea of applying centrifugal force for the separation of the water from the deposit in the bottom of the reservoirs suggested itselft to me and having tried the effect practically, in 1851 I took out a patent for the manufacture of sewage manure.

The result of experiments with the patent process was to show that, by its adoption, the size of the reservoirs might be greatly reduced; that the deposit from the bottom of the reservoir might be abstracted without exposing it by the removal of the supernatant water; and that it might be rapidly reduced into a sufficiently solid state to admit of its being packed in casks, stored in pits or heaps, or moulded into bricks for the purpose of farther drying by natural evaporation. In the latter part of 1851, Mr. Robert Stephenson and Professors Aikin and Taylor having expressed very favourable opinions of the practicability of my amended scheme, which opinion they allowed me to publish, parties were thereby induced to purchase my patents for Great Britain and Ireland; and in 1852 an Act of Parliament was obtained, incorporating the "Patent Solid Sewage Manure Company," and enabling the company to raise capital to the extent of 100,000 *l.*

In February 1852, the directors resolved that temporary works should be erected in Leicester for the purpose of manufacturing the manure upon a sufficiently large and practical scale, having in view three objects: the first being to ascertain whether the lime process effectually disinfected the sewer water, and if so, whether it could be practically used upon the large scale. The second, to ascertain whether the removal of the precipitate from the bottom of the reservoir, and the abstraction of the water from it by means of centrifugal force, could be practically carried out upon the large scale, and at a sufficiently small cost. The third object being, to manufacture a sufficient quantity of the manure to enable agriculturists to prove its commercial value; considering that their practical opinions would be a much better test than chemical analysis only; and it was resolved, that upon the result of these trials the question of proceeding with the company should be decided. Works were accordingly erected, and after many alterations and improvements upon the original scheme, which probably would not have suggested themselves unless the opportunity of carrying the plan out practically had been afforded, the directors were so satisfied with the result, that they felt justified in entering into a contract with the town council of Leicester, undertaking, in return for the exclusive right to all the sewage water for a period of 30 years, to disinfect it, and discharge the water in an innoxious state into the river Soar for the same period.

The estimated cost of the necessary works is 25,000 *l.*, and contracts were entered into in April last for the erection and completion of them in last October, but owing to unfortunate and unforeseen circumstances—first, to the delay in obtaining the land; secondly, to the unparalleled wet season, which has peculiarly affected these works, the site of them being on low marsh ground; and, thirdly, from the great difficulty in obtaining labour, owing to the strikes amongst the workmen, and the delay in obtaining the materials,—I am afraid these works, which, under ordinary circumstances, might easily have been completed in five months, will not be in effective operation much, if at all, before next summer.

I will now proceed to describe the temporary works and the process to the maturing of which I have devoted the greatest portion of my time for the last two years, and have completely satisfied myself that the scheme is not only practicable and remunerative, but may be made very profitable, when carried out on a larger scale than opportunity has hitherto afforded.

The temporary works at Leicester were erected upon ground belonging to the town council, upon the banks of the Leicester Navigation, near the outfall of the filthiest sewer in the town, a branch from which supplied the works with sewer water. The use of the ground was granted to the company at a merely nominal rate by the town council, who, in this, as in other instances, have afforded every facility to enable the company to demonstrate to the public the practicability of disinfecting the water, and manufacturing the manure.

As regards the size of the temporary works, they were calculated for a population of 5,000, previous to the introduction of a supply of water into the town from the new waterworks. I do not mean to imply that we have actually deodorised the sewer water from a population of 5,000 during 12 months, for this would be inaccurate, as the constant interruption arising from the practical modifications and improvements of the machinery used in the process, would, of itself, have prevented such a course; but the works have for different periods been kept in continuous operation, day and night, that I might have the opportunity of assuring myself that the process was complete as affecting the sewer water during any of those periods; the object of these temporary works being, as I have before stated, to ascertain whether the process could be practically and remuneratively carried out by the means proposed.

At the commencement of our operations, it was found that the process of deodorising was not perfect, and it was discovered that its partial failure was due to the sewage water being in too concentrated a condition; the new supply of water to the town having only been introduced at Christmas last, while the operations of the company commenced more than a year and a half ago. To prove whether this conjecture was correct, a portion of the partially deodorised water was returned into the engine well, and when the concentrated sewage was reduced to a quality equal in strength to that of the metropolitan sewer water, the process was completely successful.

Professors

Professors Aikin and Taylor ascertained the strength of the London sewer water, and determined what amount of dilution was necessary to reduce the Leicester sewer water to the requisite strength, and by their experiments I was guided in my practical operations.

Again, it was found that at night, when the manufactories were not at work, and the waste water from the engines had ceased to flow into the sewer, their contents were chiefly urine and excrementitious matter in a state of far greater concentration than the day sewage; the effect of the lime was only partial; but upon diluting it as in the former case, the process of deodorising was completely successful; the effluent water from the reservoir, after the process was completed, being perfectly free from all taste and odour, excepting occasionally from the lime when it had been used in excess.

A quantity of the effluent water from the reservoir was taken in August last, by Mr. Theodore West, chemist, of Leeds, and subjected to an analysis; and he found that there was not a trace of any other matter than carbonate of lime, sulphate of lime, and chloride of sodium, proving clearly that all noxious matter had been abstracted during the process.

The mode of operation in this process is as follows: the water is pumped up from the sewer, and into the pipe conveying it to the reservoir a smaller pipe is introduced, connected with the lime pump, which works, stroke for stroke, with the sewer water pump, and the process of deodorising is so rapid, that when the mixture of sewer water and lime is discharged into the reservoir, there is no noxious odour arising from it. The discharge takes place into the first part of the reservoir, divided into three compartments, in each of which is an agitator, worked by the engine; a thorough mixture having thus been effected, it flows through the upper end of the reservoir, and is from 30 to 40 minutes passing through this portion, during which time 7-8ths or more of the separated matter has been precipitated on the bottom of the reservoir. There still remains, however, about 1-8th of solid matter, and which, being lighter than the first portion, requires a longer time for precipitation, so as to render the water clear and bright.

The water is, in fact, two hours in passing from the sewer to the farthest end of the reservoir, where it is discharged; and arrangements are made to enable the water to flow continuously through the reservoir, with, as nearly as practicable, the same velocity over the whole section. The openings of the discharging gates being proportioned to the depth of water in the cross section, and thus the necessity of having two reservoirs for the purpose of filling one while the water in the other is being cleared by deposition is avoided; for although the stream is continuous, its velocity being only about 1-4th of an inch per second, it does not interfere with or arrest the precipitation of the solid matter.

The operation of removing the precipitate from the bottom of the reservoir, so as not to interfere with the continuous flow of the water in the reservoir, is performed by means of a screw, which removes the precipitated matter into an adjoining well or shaft as rapidly as it is formed, without disturbing the process of precipitation which is carried on above it.

The bottom of the first portion of the reservoir is made to slope towards the centre, along which a culvert runs, semicircular at bottom and open at top. In the bottom of this the screw is laid, and the precipitate collecting upon it from the sloping sides is, as the screw revolves, carried into the adjoining well. The practical working of this arrangement is now completely successful.

It is the combination of these two arrangements, viz., the continuous current and the removal of the deposit without disturbing the supernatant water, that has enabled me to reduce the size of the reservoirs to so great an extent. This will be seen hereafter, when I give the sizes of the reservoirs I propose for the metropolis.

The next operation is to raise the deposit or mud from the well or shaft, by means of a Jacob's ladder, very similar in appearance and construction to the ladder of buckets in the dredging machines used on the Thames, excepting that its position is vertical, and its construction much slighter. The mud thus raised in a semi-fluid state into a tank flows through a pipe to the centrifugal machine; the machine is then set in motion, at the rate of about 1,000 revolutions per minute, and in half an hour from the time the precipitate lay on the bottom of the reservoir. It is in a sufficiently dry state to pack in casks, or to mould in the form of bricks for farther drying.

A given bulk of the manure, when introduced into the centrifugal machine, is reduced to about one-third of its original bulk, two-thirds, as water, having been separated from it by the operation.

The machines which are now making for the new Leicester Sewage Works are each calculated to turn out 360 lbs. of manure in an hour in the state of consistency previously mentioned.

Thus it will be seen that the whole operation of disinfection and conversion into manure is very simple; and I think it must appear evident, that after the experience of a year and a half of what may be done in works sufficient for a population of 5,000, that by simple multiplication of the means, it may be made available for any population, however great, as in this case the increased quantity of sewage water merely involves a simple increase of machinery, in proportion to this increase, the increase of power for raising it being in direct proportion to the quantity.

There is one very important conclusion that may be drawn from what has been said, viz., that an increased supply of water, by which means only the greatest and most immediate sanitary effect will be produced upon the atmosphere of dwellings in any town, does not render the plan just described abortive, on account of the enormously increased expense, but, on the contrary, within certain limits, the more the sewage is diluted, the more complete is the effect of the disinfection of the water and the precipitation of the manure; so that the sanitary objects of the Commissioners, and the commercial interests of a company

Correspondence, &c.

carrying on the works, would not be opposed to each other, as would be the case in the event of the liquid scheme being adopted.

In the temporary works at Leicester, although the reservoir, the steam-engine and boiler, the machinery for manufacturing the manure, and the store for the manure, whether in casks or exposed in heaps for drying, are under one roof, no noxious effect has in the slightest degree been caused to the workmen employed in the process; and although the manure itself, when taken from the cask and held to the nose, has a smell which an agriculturist would not object to, nevertheless no smell whatever is perceptible at the distance of a foot or two from the manure.

As regards, however, the proposed large works for Leicester, there will be two reservoirs, about 200 feet long and 44 feet wide. Two-thirds of the area will be covered with an iron girder and brick arch floor for the warehouses above, to economise space, and the whole will be roofed over. And as this portion of the design is intended to be carried out in all future works, however large, all chance of nuisance from exposure is avoided. But the fact is completely established, that no nuisance does arise, either from the reservoirs, or in the process used in manufacturing.

Upon this point, and in corroboration of my statements, I beg leave to call your attention to the practical evidence of his Grace the Duke of Rutland, given in a letter I had the honour of receiving from him; also of Joseph Whetstone, Esq., the chairman of the Local Board of Health, John Ellis, Esq., late M. P. for Leicester, the Town Clerk, Dr. Shaw, and other medical gentlemen of the town of Leicester, given in a certificate, which, with another from John Buck, Esq., late medical officer of the Leicester Local Board of Health, who has had frequent opportunities of witnessing the operation of the patent process, are addressed to your Honourable Board, as I thought it might be more satisfactory to you to have the evidence of disinterested parties. Copies of these communications are given in the Appendix.

Although not in a position at present to state what the "actual commercial value of the residual manure" will be, because, as before intimated, the desire of the directors of the Patent Solid Sewage Manure Company has been to leave this to be determined by the result of its practical application by the agriculturist, and at present the manure that has been so applied has been *pro tanto* inferior to what is intended to be supplied, in its having been chiefly collected from the day sewage, unmixed with the richer night sewage, and also from the fact of its containing 60 or 70 per cent. of water instead of 20 per cent., which is the quantity it would have contained if the extent of our temporary works had afforded us room for drying it in larger quantities than has hitherto been practicable. Nevertheless, our experience has been quite sufficient to prove that, without the necessity of having recourse to expensive applications of artificial heat, simple exposure to atmospheric influence for a few weeks will reduce the moisture to 20 per cent.; so that, bulk for bulk, the manure intended for sale will contain twice as much fertilising matter as that which has at present been forwarded to agriculturists for trial. The present results, however, show that, taking guano at 10 *l.* per ton, the manure as proposed for sale is at least worth 2 *l.* 13 *s.* per ton; but, as I stated to the Commissioners verbally, I have considered it safest to calculate its commercial value at 2 *l.* or 2 *l.* 2 *s.* per ton, and this amount would yield, after deducting the cost of manufacture and repairs, a fair per-centage upon the capital expended in the construction of the works. But the actual value will not be ascertained until time has afforded more extensive experience. But while it is undoubtedly of importance that the Commissioners should be satisfied that it is of sufficient value to induce capitalists to subscribe for its manufacture, its real value, if greater, must depend in some measure upon the favourable locality of the works in relation to the agricultural districts; and hence its concentration, by reducing the cost of carriage, will increase its value, weight for weight. And again, the reduction in the cost of manufacture which the last year's experience has already enabled me to effect has also shown that, with larger opportunities, further reductions may be effected, which, I need not remind the Commissioners, has generally been the case in all new manufactories.

The cost of manufacture will be proportionably greater in small works than in larger ones. My present experience, however, enables me to state, that upon the average the cost of manufacture will not exceed 20 *s.* per ton.

I trust the foregoing explanations, accompanied by the certificates referred to, which, if necessary, might be multiplied by the evidence of various parties from other towns who have visited the temporary works for the purpose of ascertaining whether the process had been successfully carried out, will answer satisfactorily the portions of your instructions included in the following extract, which is in continuation of the previous quotation from them:—

"And particularly as to the extent of deodorisation and purification of the sewage water effected by the processes, the actual commercial value of the residual manure, and as to the practicability of constructing sewage manure works without causing in any degree nuisance to the vicinity."

The second portion of my instructions are conveyed in the following terms:—

"That he be requested specially to report as to the expediency of placing works for the manufacture of the sewage water into solid manure solely at the outlets of the intercepting sewers proposed for each side of the river, or at intermediate stations, and as to what, in his opinion, would be the maximum and minimum sizes of works, considered in relation to the extent of population, which, in a sanitary and economical point of view, might be established for the manufacture into solid manure of the sewage waters of the metropolis."

From

From calculations I have made in the course of this investigation, I feel justified in saying that works might be profitably established for a population of 5,000, and to any extent above that number. For a less population I have made no calculation, as much must depend upon local circumstances.

The terms issued by the Patent Solid Sewage Manure Company in March last for town contracts were as follows :—

"*Heads of Terms for a Town Contract.*

"The sewers of the town to be rendered efficient without cost to the company.

"The sewage to be brought to an outfall convenient for the establishment of the company's works, and to be guaranteed to the company for a term of not less than 30 years, with an option in the company's favour of undertaking the emptying of privies, cesspools, ashpits, &c., free of charge.

"The land needful for the company's works, with convenient access by land, and also by water where practicable, to be furnished free to the company for 30 years.

"The company to put up, maintain and work, free of charge to the town, efficient works for deodorising the sewage and converting it into manure, according to the patent processes, during the term of the contract.

"The town to have the option, at the end of the term, of purchasing the company's works at a fair valuation.

"In the event of this option not being exercised by the town, the company to have the option of purchasing the land and approaches at a fair valuation.

"The above terms must be considered subject to modification as regards towns unfavourably circumstanced for the application of the patent processes, or for the manufacture of the manure.

"Communications may be addressed to the Directors, to the care of Messrs. Wilson, Harrison & Bristow, solicitors, 1, Copthall-buildings, London, or to Thomas Wicksteed, Esq., 40, Coleman-street, London."

And if the company decline undertaking any works themselves, they will be perfectly ready to grant licenses to towns, upon reasonable terms, if desired.

From the foregoing terms, in connexion with what I have said as to the size of works with regard to the population, it will be seen that the position of works for the metropolis would be left very much to the decision of the Commissioners; which decision would probably be much influenced by the opinion of their engineer as to the difference between the value of land in any particular locality, and the cost of extending the sewer to another situation, in which land might be obtained at a cheaper rate.

Upon this point, however, I shall report further hereafter, but beg to observe, that the sites for works need not necessarily be on the line of the large main sewers, as a branch sewer may be taken to any locality convenient for their erection, the object being to convey the sewage water alone to the manufactory, and not flood or storm waters. The nearer, however, they are placed to the banks of a stream the better, as there must be an outlet from them to carry off the disinfected water, in addition to the reasons given or implied in the company's terms, before quoted.

The following is the next point upon which I am requested to report :—

"That he be requested further to report whether, with existing information as to the value of sewage water, a company would guarantee to the public the conversion of the whole of the metropolitan sewage into manure."

Upon this matter, I can only repeat what I have already stated to the Commissioners verbally, that by the Patent Solid Sewage Manure Company's present Act of Parliament their capital is limited to 100,000 *l.* Notices, however, have been published of their intention to apply in the ensuing Session to Parliament for an extension of power to raise further capital. They are also applying for a charter of incorporation. Should they succeed in attaining these objects, there can, I think, be little doubt of their readiness to enter into a contract with your Honourable Board upon the terms already quoted. I am not in a position, however, as an individual director of the company, to say more upon this point, excepting that, personally, I shall strongly recommend the company to enter into such contract.

Proposed Works.

Without giving an opinion as to the actual sites that should be secured by the Commissioners, which, I have no doubt you will agree with me, would be premature, not to say imprudent, and in the choice of which I have no doubt you will be much influenced by your engineers, to whom I shall be happy to give my assistance if required. I may state, that it appears to me, that four sites at least should be obtained for the proposed works. The first, in the neighbourhood of the River Lea, uniting A. and B., or the Hackney and the middle levels of the northern division; the second, in the neighbourhood of the same river to receive C., or the low level of the northern division; the third, in the neighbourhood marked I. upon the plans supplied to me by your engineer, uniting the Acton, Cheyne Walk, Brentford, and Fulham levels of the western division; and the fourth, on the banks of the Thames on the south side of the river for the southern sewage.

Supposing in other respects these sites to be eligible, there could be no objection to them on the part of the Patent Solid Sewage Manure Company; but to repeat what I have hereinbefore intimated, there is nothing as regards the disinfecting and manufacturing of

Correspondence, &c.

the manure to prevent either a concentration of, or a further sub-division of manufactories; and if, therefore, it should appear hereafter that a different arrangement would lead to a reduction in the size and cost of the main sewers, or, for causes at present not foreseen, an alteration should be deemed advisable, I see no objection to its being made. However, this part of the subject does not appear to me to press in such a manner as to lead to the necessity of my delaying the completion of this report. Should, however, the sites herein suggested, be finally determined upon by the Commissioners, the following statement will represent the principal works that would be required for each.

First.—The Quantity of Land required for all Purposes, No. 1, and for Reservoirs, No. 2, included in No. 1.

	PRESENT POPULATION.		PROSPECTIVE POPULATION.	
	No. 1. Land for all Purposes.	No. 2. Land for Reservois.	No. 1. Land for all Purposes.	No. 2. Land for Reservoirs.
	Acres.	*Acres.*	*Acres.*	*Acres.*
1st Site - -	8½	2¾	12½	4¼
2d Site - -	6	2	6½	2¼
3d Site - -	1½	–½	5¼	1¾
4th Site - -	5¾	2	7	2¼
TOTAL - -	21¾	7¼	31¼	10½

Second.—Full and Average Power of Pumping Engines and Coals.

	Full Power.	Average Power.	Coals per Annum.	Full Power.	Average Power.	Coals per Annum.
	H. P.	H. P.	*Tons.*	H. P.	H. P.	*Tons.*
1st Site - -	Nil	Nil	Nil	Nil	Nil	Nil
2d Site - -	223	148½	1,545	236	157	1,635
3d Site - -	37½	25	342	141½	94⅓	981
4th Site - -	225	150	1,560	270	180	1,872
TOTAL - -	485½	323½	3,447	647½	431⅓	4,488

With the exception of the land and approaches, the above works would have to be provided and maintained by the company, and, in addition, the company would have to provide for manufacturing purposes:

Engine-power for present population - - - 2,955 horses-power.
Ditto - for prospective ditto - - - 4,286 ditto.
Coals per annum for present ditto - - - 26,341 tons.
Ditto - for prospective ditto - - - 38,205 ditto.

To show the importance of having manufactories established on sites accessible for carriage, I may state, that the probable present and prospective annual tonnage of coals, lime and manure, will be as follows:

Tons.
For present population - - - - - 214,000 per annum.
For prospective ditto - - - - - 310,000 per annum.

The capital required for the construction of works for the prospective population would not exceed 1,000,000*l.* sterling.

In conclusion, I beg leave to refer you to the appendices for further detailed information, and trust that they, combined with the foregoing report, will afford you the information you are desirous of obtaining.

I have, &c.
(signed) *Thomas Wicksteed*, C.E.

Appendix

Appendix (A.)

DISPOSAL of the SEWAGE MATTER of the METROPOLIS LIQUID SCHEME.

Quantity of Sewage Water.

TAKING the amount of sewage water at 36 gallons per head per diem, which will be the quantity at ordinary periods, exclusive of floods, and the population in 1851 being, according to the census, 2,362,236, and supposing the increase to be at the rate of 20 per cent., in 10 years, from 1831 to 1841, it was 17¾ per cent.; from 1841 to 1851, it was 21¼ per cent., then, in 1861, it will amount to 2,834,683.

The sewer water will then amount to—

102,048,588 gallons per diem; or
2,834,683 barrels per diem; or
16,374,935 cubic feet per diem; and to
1,034,659,295 barrels per annum; or
166,719,190 tons per annum.

Quantity per Acre.

The late Mr. Smith, of Deanston, calculated, that from 80 to 160 tons of sewage water per annum per acre might be usefully applied to the land upon an average of arable and pasture, or in some instances more.

An average of 150 tons per annum per acre may, therefore, be taken as the quantity to be applied, and as the solid contents of the average sewage-water from King's Scholars' Pond Sewer, as analysed by Professor Brande and Mr. John Thomas Cooper, the eminent chemists, was equal to $\frac{1}{360}$th part, every 150 tons will contain 6 cwt. of solid manure.

ACREAGE required to consume the whole of the Metropolitan Sewage Water.

The annual amount of sewage water being equal to - -	166,719,190	tons,
One five hundredth part will amount to - - - -	333,438	tons, or
	6,668,760	cwt.
Which, divided by 6 cwt. per acre, will give as the required acreage - - - - - - - - - -	1,111,460	acres.

Extent of District to consume the Sewage Water.

Suppose, under the most favourable circumstances, all the sewage of the metropolis could be collected in one central spot, then, as no appreciable quantity would be likely to be used in the metropolis, a radius of three miles at least must be passed through before any of the sewage could be used, equal in area to 28 square miles.

Then the area of roads, towns, villages, plantations and woods must be excluded from the effective area of the proposed district; and as it is not likely that much more than half the estates to be supplied would use 150 tons per acre, nor is it probable that any one manure will entirely supersede the use of another, the district to be supplied must be at least double the acreage capable of being supplied by the manure—equal to 2,222,920 acres, or 3,473 square miles; which, added to the 28 square miles, makes the required district equal to 3,501 square miles, or a circle of 66·8 miles diameter, and a radius of 33·4 miles.

SIZE of Main Pipes required to distribute the Sewage Water.

The water will have to be raised and distributed as fast as the sewers supply it, and probably about $\frac{7}{8}$ths of the whole quantity is supplied during 12 hours in the day; but I shall assume only $\frac{3}{4}$ths for the basis of my calculation.

Quantity per diem - - - - - -	102,048,588	gallons, or
	16,374,934	cubic feet.
Quantity per 12 hours, or $\frac{3}{4}$ths - - -	12,281,200	cubic feet, or
	17,057	cubic feet per minute.

Taking the velocity of the water at 180 feet per minute, the area of a pipe to convey the quantity of water would require to be equal to 95 square feet, or 11 feet diameter, or 12 pipes each of 38 inches diameter.

Now, dividing the total effective area into 4, there will be 868¾ square miles for each; but to the first district 28 square miles must be added, making the first area equal to 896¼ square miles equal to a radius of - - - - 16·8 miles of 38 inch pipe, 16·8 miles.

2d area -	1,764	sq. miles	=	to a radius of	23·6	„	33	„	6·8 „
3d ditto -	2,632	„	=	„	28·9	„	27	„	5·3 „
4th ditto -	3,501	„	=	„	33·4	„	19	„	4·5 „
									33·4 „

Correspondence, &c.

Length of Main Pipes.

12 pipes of	38 inches	diameter each,	16·8 miles	long - - -	201·6	miles.
12 „	33	„	6·8	„ - - -	81·6	„
12 „	27	„	5·3	„ - - -	63·6	„
12 „	19	„	4·5	„ - - -	54·0	„

Divide this circle into 8 spaces, inclosed by 7 concentric circles of mains, and suppose pipes, averaging 12 inches diameter, to be thus laid, connecting the 12 radial pipes—then the length of the 12-inch pipes will be as follows:

1st circle - - -	14 miles	diameter, or	43·98 miles circumference.
2d ditto - - -	22	„ or	69·11 „
3d ditto - - -	30	„ or	94·24 „
4th ditto - - -	38	„ or	119·30 „
5th ditto - - -	46	„ or	144·50 „
6th ditto - - -	54	„ or	169·60 „
7th ditto - - -	62	„ or	194·70 „
			835·43 miles of 12-inch pipe.

Estimate for Mains.

Miles.	*Yards.*	*Inch.*	*Tons.*	*Tons.*	*£.*
201·6 or	354,816 of	38 diameter,	at $68\frac{1}{8}$ per 100 yds.	241,707 at £. 8	= 1,933,656
81·6 or	143,616 of	33 „	at $53\frac{2}{10}$ „	76,395 at „	= 611,160
63·6 or	111,936 of	27 „	at $37\frac{8}{10}$ „	42,298 at „	= 338,384
54·0 or	95,040 of	19 „	at 21 „	19,950 at „	= 159,600
835·4 or	1,470,304 of	12 „	at $10\frac{1}{8}$ „	148,868 at „	= 1,190,944
1,236·2					£. 4,233,744

Laying and Jointing.

354,816 yards of	38 inches,	at 22 *s.* - -	£. 390,297	
143,616 „ of	33 „	at 17 *s.* - -	122,073	
111,936 „ of	27 „	at 11 *s.* 6 *d.* - -	64,363	
95,040 „ of	19 „	at 7 *s.* - -	33,264	
1,470,304 „ of	12 „	at 3 *s.* 3 *d.* - -	238,924	
				848,921
				£. 5,082,665

Friction.

Inches.	*Yards.*	*Velocity. Feet.*	*Head p. 100 Yards. Inches.*		*Feet.*
38 - -	29,568 - -	180 - - -	5·81	$= \frac{295{\cdot}68 \times 5{\cdot}81}{12}$	= 143·15
33 - -	11,968 - -	„ - - -	6·69	$= \frac{119{\cdot}68 \times 6{\cdot}69}{12}$	= 66·72
27 - -	9,328 - -	„ - - -	8·18	$= \frac{93{\cdot}28 \times 8{\cdot}18}{12}$	= 63·58
19 - -	7,920 - -	„ - - -	11·63	$= \frac{79{\cdot}20 \times 11{\cdot}63}{12}$	= 76·75
				Friction - - - - - -	350·0
				Head for distribution - -	150·0
				Pressure - - - - - - -	500·0

Engine Power.

$\frac{17{,}057 \text{ cubic feet per minute} \times 500 \text{ feet}}{528} = 16{,}152$ horses power, or 80 engines of 200 horses power each, and allowing one-tenth for spare power, or one extra engine to every eight, will make the total required 88 engines, or 17,767 horses power.

Taking the engines and boilers, engine and boiler houses, chimnies, coal bins, &c., at 100 *l.* per horse power,

Engines, &c., 17,767 horses power, at 100 *l.* - - £. 1,776,700

Taking the cost of distributing pipes and tanks for holding the liquid sewage when it cannot be applied, at 3 *l.* per acre,

1,111,460 acres at 3 *l.* - - - - - - £. 3,334,380

Summary.

Summary.

	£.
Engine power and buildings	1,776,700
Mains and laying	5,082,665
Distributing pipes, &c., upon farms	3,334,380
Add 15 per cent. for contingencies	1,529,301
TOTAL	£. 11,723,046

Or, £. 10 11 – per acre; or,
£. 35 3 2 per ton of solid; or,
16⅞ *d.* per ton of liquid; or,
82 *s.* 8½ *d.* per inhabitant.

Coals required per Annum.

Average power equal to - 16,152 horses.
Coals per hour per horse power - 2¾ lb.

Being the average quantity used by the Wicksteed engine at the East London Waterworks in 1849.

Engines working 24 hours, 365 days, will consume, per annum - 173,700 tons.

Cost of coals, stores, labour and repairs of engines and buildings, taken at 15 *l.* per annum per horse power:

Annual cost for 16,152 horses power, at 15 *l.* - £. 242,280

Probable Cost of Manure to make it Remunerative.

Supposing 10 per cent. upon the capital to cover all disbursements and yield a sufficient profit, this will amount to 1,200,000 *l.* per annum.

The sewage water, as before calculated, amounts to 166,719,190 tons per annum.

$\frac{166,719,190}{1,200,000}$ = to nearly 139 tons, for 1 *l.* sterling, or 1·72 *d.* per ton.

The amount of solid manure, as before stated, is equal to 333,438 tons.

$\frac{1,200,000}{333,438}$ = to 3 *l.* 11 *s.* 9 *d.* per ton.

Although I state in the body of the report that the execution of such work as the one herein estimated for is totally impracticable in the neighbourhood of the Metropolis, these calculations will, at least, furnish the data upon which such estimates ought to be formed for localities suitable for such works.

Appendix (B).

COPY of a Letter from His Grace the Duke of *Rutland*.

Sir, Belvoir Castle, 17 January 1854.

IN acknowledgment of the receipt of your letter of the 13th instant, I can have no hesitation in expressing the agreeable surprise which I experienced on visiting your Sewage Manure Works at Leicester, when I was there in quarters with my regiment.

From what I saw at that time, I cannot doubt the success of your scheme, and that success must result in a most important public benefit.

Having myself tasted the sewer water after your purifying process, I cannot refrain from adding my astonishment that it should be in so great a degree deprived of its noxious odour.

I have, &c.
(signed) *Rutland.*

Thos. Wicksteed, Esq.
Patent Solid Sewage Manure, Leicester.

P.S.—You are at perfect liberty to make any use of the enclosed.

(signed) *R.*

To the Honourable the Metropolitan Commissioners of Sewers.

WE, the undersigned, at the request of Mr. Wicksteed, have much satisfaction in certifying that his process of disinfecting the sewer water of Leicester, which we have witnessed at the temporary works at the Bay-street Wharf, appears to us most complete in a sanitary point of view, the sewer water, by a continuous process, being entirely deprived of its noxious odour and taste.

(signed) *Thos. Macaulay,* Surgeon.
W. H. May, Surgeon.
Charles Bowmar, Surgeon.
Alfred Cooper, Surgeon.
J. Whetstone.
George Shaw, M.D.
John Barclay, M.D.
Samuel Stone, Town Clerk.
John Ellis, Chairman of the Midland Railway Company.

Leicester, 14 January 1854.

On behalf of the Sewerage Committee of the Borough of Leicester,
J. Whetstone,
Chairman of the Local Board of Health.

Correspondence, &c.

To the Honourable the Metropolitan Commissioners of Sewers.

Having had, as officer of health, frequent opportunities of witnessing during the last 12 months the process of disinfecting the sewage water of Leicester at the mouth of one of the largest and filthiest of the sewers of the town, as conducted by Mr. Wicksteed, I have much satisfaction in being able to certify to its complete efficiency, as it deprives the sewer water both of noxious smell and taste: while I had the honour of holding the position of officer of health to the local board, it was a matter of considerable anxiety to me that some process should be carried out on a large scale to purify the streams of this neighbourhood, the bad effects of which on the health of the neighbouring population, I have had, unfortunately, too many opportunities of witnessing.

From my official position I was naturally more interested in the details of this process, than other medical men in the town, and have had every facility afforded me of witnessing it. I can safely assert that, in the processes of disinfecting and manufacturing there are no exhalations of offensive or even of disagreeable odour, and consequently the health of those persons employed in the operation, or living in its close vicinity, cannot in any way be injuriously affected.

I am quite convinced that these temporary works are conducted on a scale sufficiently large to justify me in saying that the large works now erecting will effect the same results upon the whole of the sewerage of the town, which the temporary works have upon a portion of it.

In June last I visited these works, in company with about 50 members of the Provincial Medical and Surgical Association, and can state as a professional man, that their unanimous opinion was, that the question of disinfecting the sewer water of towns had, in a sanitary point of view been satisfactorily solved.

(signed) *John Buck*,
Surgeon and Medical Superintendent of the Leicester County Asylum, and formerly Officer of Health to the Local Board of Health of Leicester.

Borough of Leicester, 12 January 1854.

Appendix (C.)

Table, No. 1.

Showing the Present and Prospective Population, Quantity of Sewer Water, and Anticipated Amount of Manure, &c.

	PRESENT POPULATION.					PROSPECTIVE POPULATION.				
	Population.	Sewer Water per 24 Hours.	Average per Minute per 24 Hours.	Average per Minute; ¾ of whole Quantity delivered in 12 Hours.	Probable yield of High Dried Manure per Annum.	Population.	Sewer Water per 24 Hours.	Average per Minute per 24 Hours.	Average per Minute; ¾ of whole Quantity delivered in 12 Hours.	Probable yield of High Dried Manure per Annum.
Northern Division:		*Cubic Feet.*	*Cub. Feet.*	*Cubic Feet.*	*Tons.*		*Cubic Feet.*	*Cub. Feet.*	*Cubic Feet.*	*Tons.*
Hackney Brook Level A. / Middle Level B.	874,656	4,373,280	3,037	4,555½	58,698	1,329,984	6,649,920	4,618	6,927	89,255
Low Level C.	645,120	3,225,600	2,240	3,360	43,294	683,136	3,415,680	2,372	3,558	45,845
Western Division:										
Acton Line E. / Cheyne Walk Branch, F. / Brentford Line G. / Fulham Branch H.	146,016	730,080	507	760½	9,799	551,808	2,759,040	1,916	2,874	37,032
Southern Division	600,000	3,000,000	2,083	3,125	40,266	720,000	3,600,000	2,500	3,750	48,319
Total	2,265,792	11,328,960	7,867	11,801	152,057	3,284,928	16,424,640	11,406	17,109	220,451

TABLE, No. 2.

SHOWING the Horses Power and Coals required for Pumping Engines, Quantity of Lime for Deodorising, Area of Reservoirs, and of Land required for Proposed Works.

	PRESENT POPULATION.						PROSPECTIVE POPULATION.					
	Pumping Engines.			Lime for Deodorizing, per Annum, in Tons.	Area of Reservoirs in Acres.	Area of Land probably required for Proposed Works, in Acres.	Pumping Engines.			Lime for Deodorizing, per Annum, in Tons.	Area of Reservoirs in Acres.	Area of Land probably required for Proposed Works, in Acres.
	Horses Power during 12 Hours of the Day.	Average Horses Power for 24 Hours.	Coals required per Annum.				Horses Power during 12 Hours of the Day.	Average Horses Power for 24 Hours.	Coals required per Annum.			
	H. P.	*H. P.*	*Tons.*	*Tons.*	*Acres.*	*Acres.*	*H. P.*	*H P.*	*Tons.*	*Tons.*	*Acres.*	*Acres.*
Northern Division, A. and B.	- nil -	- nil -	- nil -	12,688	$2\frac{3}{4}$	$8\frac{1}{2}$	- nil -	- nil -	- nil -	19,285	$4\frac{1}{4}$	$12\frac{1}{2}$
„ Low Level C.	223	$148\frac{1}{2}$	1,545	9,354	2	6	236	157	1,635	9,905	$2\frac{1}{4}$	$6\frac{1}{2}$
Western Division, E. F. G. and H.	$37\frac{1}{2}$	25	342	2,117	$-\frac{1}{2}$	$1\frac{1}{2}$	$141\frac{1}{2}$	$94\frac{1}{3}$	981	8,001	$1\frac{3}{4}$	$5\frac{1}{4}$
Southern Division - -	225	150	1,560	8,700	2	$5\frac{3}{4}$	270	180	1,872	10,440	$2\frac{1}{4}$	7
TOTAL - - -	$485\frac{1}{2}$	$323\frac{1}{2}$	3,447	32,859	$7\frac{1}{4}$	$21\frac{3}{4}$	$647\frac{1}{2}$	$431\frac{1}{3}$	4,488	47,631	$10\frac{1}{2}$	$31\frac{1}{4}$

TABLE, No. 3.

Showing the Horses Power and Coals required for Machinery Engines.

	Machinery Engines working 16 Hours per Diem, 6 Days per Week.			
	PRESENT POPULATION.		PROSPECTIVE POPULATION.	
	Horses Power.	Coals required, Tons per Annum.	Horses Power.	Coals required, Tons per Annum.
	H.P.	*Tons.*	*H. P.*	*Tons.*
Northern Division, A. and B. -	1,140	10,162	1,736	15,475
„ Low Level, C. -	840	7,488	890	7,933
Western Division, E. F. G. and H.	190	1,694	720	6,418
Southern Division - - -	785	6,997	940	8,379
TOTAL - - -	2,955	26,341	4,286	38,205

CAPITAL required to be raised by the Patent Solid Sewage Manure Company, to carry out their Scheme in the Metropolis.

For the present quantity, say 152,057 tons of solid manure - - - £. 690,000

For the prospective quantity, say 220,451 tons of solid manure - - £. 1,000,000

Correspondence, &c.

Revenue and Disbursements.

Revenue to be derived from 152,057 tons, at 2 *l.* per ton	£. 304,114
Deduct disbursements, at 1 *l.* per ton	152,057
Leaving	£. 152,057

Or, 22 per cent. upon capital expended; but out of this, the expenses of the commercial departments of the company will have to be taken.

Revenue to be derived from 220,451 tons, at 2 *l.* per ton	£. 440,902
Deduct disbursements, at 1 *l.* per ton	220,451
Leaving	£. 220,451

Or, 22 per cent., as in the former case.

Note.—Assuming the Commissioners to enter into such an arrangement with the Patent Solid Sewage Manure Company as suggested in the body of this report, it will be seen by an examination of the foregoing tables that considerable saving will accrue to them in the first cost of engines and buildings, and in the annual cost of coals, stoves, labour and repairs for pumping engines; but the tables do not give the actual amounts, because for the purposes of deodorizing and manufacture, the water will have to be raised seven or eight feet higher than the natural outfall, whereas, if it were at once discharged, like the flood waters into the outfall, without going through the process of disinfection and precipitation, this extra lift would be avoided.

Diluted Leicester Sewage Water.

Upon diluting the above concentrated sewage water with four measures of river water, the quantity obtained was 124 grains per gallon; or 34 grains obtained by spontaneous deposit, and 90 grains due to the lime process; the lime used, but not included in the foregoing quantities, was about 25 grains to the gallon of 70,000 grains.

London Sewage Water.

The quantity of solid matter obtained from an average of sewer waters; from the sewer between the London and Southwark Bridges, and the Fleet sewer in the City, from Essex-street and King's Scholars' Pond sewer, west of the City, and from Bow Common sewer black ditch, when running slow and running quick, east of the City, collected in 1845, and experimented upon by Mr. Aikin and Mr. Nash, produced, by the lime process, 125 grains per gallon, exclusive of the lime employed, which was equal to 25 grains per gallon.

The result is nearly similar to that obtained from the diluted Leicester sewer water, the latter, as mentioned in the body of the report, having been diluted, to assimilate it to the strength of the sewer water of the metropolis.

Appendix (D.)

Solid Contents of Sewer Water.

LEICESTER.

Twenty-four samples of water were taken, one every hour in the day, from each of the seven sewers in Leicester, and the whole mixed together, to make an average sample upon analysis, by Messrs. Aikin and Taylor; the solid contents per imperial gallon were found to be as follows:

Solid matter held in solution	98·0 grains.
Ditto, held in suspension	139·7 „
TOTAL	237·7 „

The precipitate obtained from the same samples by the lime process (exclusive of the lime employed) was	228·7 grains
Deduct, as before, that held in suspension	139·7 „
Leaves separated from the liquid, by the process	89·0 „

The

The solid contents obtained from an imperial gallon precipitated by the lime process, less the weight of lime employed, from each of the sewers, to show the great variation in quantity, was as follows:

	Grains.		Grains.
No. 1. - - - -	93.	No. 5. - - - -	23.
No. 2. - - - -	606.	No. 6. - - - -	344.
No. 3. - - - -	73.	No. 7. - - - -	60.
No. 4. - - - -	79.	From a mixture of all -	228.7.

No. 119.

R. Jebb, Esq. to the Right Honourable Viscount *Palmerston*.

My Lord, 1, Greek-street, Soho, 28 February 1854.

In compliance with your Lordship's directions, I beg to remind you of the letter I had the honour of addressing to your Lordship, on the 14th of December last, asking the sanction of the Government to the commencement of the main drainage works, to which an answer has not yet been returned.

I enclose a copy of my letter.

I have, &c.
(signed) *Richard Jebb.*

No. 120.

H. Waddington, Esq. to the Commissioners of Sewers.

Gentlemen, Whitehall, 7 March 1854.

I am directed by Viscount Palmerston to transmit for your consideration the enclosed printed copy of a letter from Mr. George Knowles, relative to his invention of a filtering tank for preserving the manure in the sewage of towns, for agricultural purposes.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 120.

The Sewage of Large Towns.

To the Editor of "The Hull Advertizer."

Sir,

May I trouble you with a few remarks upon what I consider the best method of separating the water from the more solid contents of sewers in towns, for agricultural purposes, without going to the labour and expense of concentrating the sewers into one locality for the purpose of deodorizing the ingredients therein contained, by what I shall call a self-acting filtering tank, which can, I believe, be erected in several localities in most towns in the United Kingdom, and without being attended with a disagreeable smell or inconvenience to the public.

The filtering tank which I propose to construct, may be made any size to suit the quantity of matter which may be expected to be thrown into it, and near the place where sewers discharge their contents. Let us, therefore, assume the area or dimensions of a tank to be 30 feet by 32 feet 3 inches. This area I propose to divide into two equal parts by a solid brick wall, of 2 feet 3 inches in thickness (or three bricks in length), and raised to the height of nine feet (the proposed depth of the tank), so that there will be now two compartments of 30 feet by 15 feet each. The receiving side of this tank shall be again divided by a 9-inch partition wall, built with apertures (or what is called here the pigeon-hole fashion) of 4½ inches by 3, to the height of six feet from the floor; so that there will be about 500 apertures in this part of the wall. Above these apertures it must be built solid to the top of the tank, which will make the whole height nine feet. The discharging side of this tank shall be again divided by a 9-inch wall, built in a similar manner to the former, but with this difference, that the apertures shall be half the size, or only 3 inches by 2, so that we have now four compartments in the tank of 30 feet in length by 7 feet 1½ inches.

The sewer will be made to discharge itself into the centre of the first compartment, and it is evident that the fluid with its ingredients will flow into the second compartment of the receiving side of the tank, up to the 2 feet 3 inch wall, and when the contents are raised to the height of the pigeon-holes or apertures, a degree of filtration begins. The whole of the second compartment on the receiving side of the tank I propose to stride with an iron grating, with apertures of 1½ inch, and I propose to sheet over this grating with round stones three or four inches in diameter, so that the water will rise freely through the interstices, and make its way at the overfall over the thick wall, which shall be six feet in width and one foot in depth; the iron grating to be placed six inches below this overfall. The water will then flow into the first compartment of the discharging side of the tank, and will diffuse itself at once into both compartments until it rises to the height of the top of the apertures in the partition wall, when another action of filtration begins. The last compart-

Correspondence, &c.

ment of the tank I shall stride with another iron grating of an inch aperture, covered with round stones as before, that the water may rise freely, and finally make its escape at an overfall of, say six feet in width and one foot in depth, and so conveyed away into the main sewer for that purpose. I propose to place a sill across the sewer or main conduit where the ingredients are conveyed into the tank, of one foot in height above the bottom of the sewer; and the sill of the sluice, which admits such ingredients to flow into the tank, shall be on a level with the bottom of the sewer, and on this sill I shall place a sluice frame, allowing an aperture of five feet in width and 18 inches high, for a valve to be raised and lowered at pleasure by a common rack and pinion, or by a common lever and fulcrum. This is for cutting off the communication between the sewer and the tank during the time of cleaning out, and also for the purpose of regulating the quantity of water thrown into the tank during the time of any extraordinary shower of rain which may be thrown into the sewers on such occasions, and that this redundant water may be conveyed away into the river in the usual way. These four compartments of the tank I propose to cover with large flags or 4-inch brick arches, if the latter, the partition walls would do for piers of such arches, and the side walls the abutments; in either case I would recommend three apertures at the top of each of such arches or flaps of say three or four feet square, for any ulterior purpose, which apertures must be covered over with large flags to prevent any smell. The most desirable situation for placing this filtering apparatus would be on sloping ground (where it could be had), and many towns to my knowledge possess this advantage, so that one end and two sides would be altogether or partially placed in the solid ground, the fourth end or side exposed in such a manner that the contents might be easily discharged into carts and tubs, and so conveyed away with the greatest facility. There must be a sluice placed on a level with the floor of each compartment, of four feet in width by five feet in height, with proper frame and valve to each, raised as before described. This cleaning out to take place when the manure and sediment is raised to the top of the apertures in the partition wall (which can be ascertained by removing a flag); there would then remain 18 inches, or two feet in depth of water between the surface of the manure in the tank and the overfall, which water I propose to draw off before the cleaning begins by a six-inch iron tube placed in the wall contiguous to the overfall, which finally discharges the water into the conduit as before described; this tube could be stopped with a short plug or valve. There must also be another tube placed in the strong wall, to fetch the water from the surface of the manure in the receiving compartments of the tank. When this is done, then the cleaning begins, and before the valves of the sluices are drawn, I would draw off into tubs or carts as much of the fluid substance as would flow through a six-inch tube, placed in the elevation of the wall, about on a level with the top of the sluices, and when no more of this fluid substance would flow, then the valves of the sluices must be drawn, and the whole contents of the tank cleaned out. (I may here observe, that the two compartments between the two feet three inch wall on the receiving side of the tank will require to be cleaned out many times for those on the opposite side once.) Should the dimensions of the above described tank be considered too small, by any partial concentration of sewers, or otherwise, it might be increased five or tenfold, if necessary, without making the least alteration in the filtering part of this apparatus, in the following manner: instead of the outside wall being built solid at the receiving side of the tank, which supports the impost of the arch, the said arch might rest upon a lintel, supported by two 14-inch square pillars and the walls, and thus arches might be turned in a similar manner to any extent required, to that point where the ingredients of sewers enter the tank, and the contents might be made to fall into any part of this receptacle, by means of a wooden trough of a proper width, with apertures in the bottom of it, at every eight or ten feet distance, of say two feet by 18 inches; thus any extent of area would act as a receptacle for a large quantity of matter between the reception of the sewage and the first range of pigeon-holes, and in cases where the advantage of such sloping ground could not be had, and in places where the whole would be obliged to be sunk below the surface of the ground, this plan of a filtering tank would operate in all respects as before described. (I beg to observe that the plan, and consequently the expense can be diminished to suit any particular sewer or locality.) Of course if a cart road could not be made to receive the contents, the manure must be hoisted up.

The late Sir Humphry Davy in his lectures on "Agricultural Chemistry," describes night-soil as "a very powerful manure;" it is, therefore, rather an unpleasant reflection in an agricultural point of view, to see that so much of this "powerful manure" should be lost in sewers, and totally thrown away to the country; and the evil is still increasing in proportion to the additional number of water-closets now in the course of erection in every part of the kingdom.

I can see no objection, Mr Editor, to the practical working of this plan, by ordinary attention to the sluice valve (where the ingredients are admitted from the sewer, and other parts of the apparatus), and should it be thought necessary to guard the apertures in the partition wall from any large substance thrown into the tank, this could be done by placing a range of iron bars in a vertical position six inches asunder, at a distance of two or three feet from them: thus, 70 or 80 per cent. of the manure in the sewerage of towns might be saved at a very reasonable expense. I, therefore, offer an humble opinion as to the best way of remedying this evil, and should you consider it worthy of a place in your excellent journal, I shall consider myself obliged by an early insertion of it.

I have, &c.

Wood End, Scarborough,
17 January 1854.

(signed) *George Knowles.*

No. 121.

Richard Jebb, Esq.. to the Right Honourable Viscount *Palmerston*, M. P.

My Lord, 1, Greek-street, Soho, 8 March 1854.

HAVING received your Lordship's instructions to furnish you with my observations with reference to the reports from Rugby, Sandgate, Tottenham, St. Thomas's Exeter, and Barnard Castle, copies of which were transmitted by your Lordship's directions to the Metropolitan Commissioners of Sewers, on the 8th and 26th of November last; also with reference to Mr. Fitzroy's letter of the 18th ultimo, conveying your Lordship's opinion that the system recommended by the Board of Health is that which ought to be adopted, as combining the greatest degree of efficiency with the greatest degree of economy, and transmitting a copy of a letter from Mr. F. O. Ward; and, generally, with reference to the respective merits of the two systems;—

I beg, in the first place, to apprise your Lordship that by order of the Commissioners, their engineer, Mr. Bazalgette, visited the five towns above referred to, and in his report (of which I have the honour to transmit a copy) are embodied the results of his observations with regard to the nature and expense of the works there executed; those results being such as to qualify the conclusions which might, without explanation, be drawn from the reports of the local Boards of the places named. From his report the following facts may be collected, that in each of the five towns there is a double system of sewers:—1, a set of old brick sewers originally constructed for surface drainage, and now maintained for that purpose out of the public rates; 2, a set of newly constructed pipe sewers, chiefly or exclusively for the reception and discharge of house drainage. The entire sewerage of the town comprehends both sets of sewers; and its cost is really the cost of both, and not the cost of the new pipes merely, as a person deriving his sole information from the reports sent to your Lordship might possibly suppose. I may here remark that a like observation applies to several other places drained under the supervision of the General Board of Health, where pre-existing brick sewers are still maintained and used as a part of the system of sewerage, whilst the reports, holding up the drainage works in those places as models of cheapness, make mention only of the new works.

At St. Thomas's, Exeter, as respects a considerable part of the town, the average cost per house of putting in house drains, &c., would appear, on the face of the report from that place, to be exceedingly low. This apparently low average is obtained by dividing the entire cost of all the house drains amongst the houses whether drained or undrained. Mr. Bazalgette (Report, p. 33) estimates the proportion of the undrained houses at about half the entire number.

It further appears from Mr. Bazalgette's Report that the cost of executing works of the same character is necessarily greater in London than in the five towns referred to. This arises from two causes:—First, all kinds of workmanship are dearer in London than in country towns. This observation cannot apply to Tottenham, but it applies to the other places. Secondly, and chiefly, in London there are several heavy items of expense, which either do not occur at all, or occur in a very slight degree, in country towns. In London, sewers, whether of pipes or of brick, must generally be laid at a much greater depth; the trenches carefully fenced, watched, and lighted; the large and weighty and closely-packed houses shored up; gas and water-pipes protected and made good; and costly pavements removed and restored. These, and like matters, add very materially to the expense of making sewers in London, and the amount is but little affected by the nature of the structure.

It is important to observe that the cost of sewering a town is not simply in the ratio of its size. Thus, the sewerage of a town of 100,000 inhabitants will cost more than that of 10 towns of 10,000 inhabitants each, because the accumulated sewage of the higher parts must be conveyed through the lower parts, demanding

Correspondence, &c.

an enlargement of the sewers of the latter beyond their own special requirements. I will here give the population of the five places particularly in question:—

Tottenham - - - - - - - - -	11,000
Rugby - - - - - - - - -	8,000
St. Thomas's, Exeter, including Exwick, whose drainage is entirely distinct - - - - - - -	5,300
Barnard Castle - - - - - - - -	4,600
Sandgate, besides a fluctuating population of uncertain amount, resorting to the village in the bathing season - - - - - - - - -	1,400
Total - - -	30,300

As to the alleged efficiency of the works: from Mr. Bazalgette's report, it appears that in none of the five towns named have the works of private drainage been commenced more than two years and a half; in some they have been commenced much more recently; and in none are they yet complete. In none has sufficient time elapsed to give the system a full trial. In four out of the five towns there have been failures; at Sandgate to a considerable extent.

For details and further particulars, I must refer your Lordship to Mr. Bazalgette's report itself; the Appendix to it contains the several reports of the local Boards.

Adverting now to Mr. Ward's letter, of which I append a copy for the convenience of reference, the general assertions it contains require to be dissected, and then they will be found to represent any thing but the accurate state of the case. I shall have occasion to notice some of them presently; but I will come at once to what I conceive to be the main question between the Commissioners of Sewers and the Board of Health.

In a vast city like London, the greatest difficulty with which a body charged with its drainage have to grapple is its surface drainage, as contradistinguished from its house drainage. Now, without asserting that the Board of Health leave surface drainage wholly out of their consideration, I still venture to say that they devote their chief attention to house drainage, and not unnaturally, seeing that they have to deal mostly with small provincial towns, where surface drainage does not hold the same relative importance as in and about London.

In a small country town, not already provided with surface drains, you may often with comparative safety allow the rain to a great extent to flow over the surface of the streets, or along the open side channels, till it reaches the nearest ditch or brook, especially where, as is frequently the case, there are no basements to the houses. In London, the whole of the surface drainage is, or ought to be, carried to its ultimate destination in covered channels under-ground, which must be deep on account of the basements and for other reasons. To show approximately the relative quantities of house and of surface drainage, which ought to be provided for, I must trouble your Lordship with a few figures. The quantity of house sewage in London may be estimated by the quantity of water supplied to the houses. This should be, though in point of fact it is not nearly so much, at the rate of five cubic feet, or about 31 gallons, per head per diem; so that, looking forward to a considerable increase of population (*i. e.* allowing for a prospective population of 3,000,000, and an adequate water supply), provision should be made for 15,000,000 of cubic feet per diem; but as the flow of house sewage, during about six hours of every day, is double its general average, the provision of house drainage sewers should be equivalent to an equable daily discharge of 30,000,000 of cubic feet.

The amount of surface drainage is measured by the quantity of rain which falls. Whatever may be the case in small country towns, in London it will not answer to provide sewers for merely ordinary rain-falls, not exceeding at any time a quarter of an inch per diem: provision at the rate of two and a half inches per diem must be made for storms. This rate will give, for the entire metropolitan area of 114 square miles, under the jurisdiction of the Commissioners, 662,000,000 of cubic feet per diem, the quantity for which surface drainage sewers ought to be provided.

The requirement, then, for house sewage is to that for surface water as 30,000,000

30,000,000 to 662,000,000, or as 1 to 22. Whilst the Board of Health pay great attention, and very properly, to 1 part in 23, they appear to under-estimate the importance of making due provision for the 22 other parts.

The mode of conveying this entire mass of sewage, amounting to 692,000,000 of cubic feet, into the Thames, its present receptacle, claims consideration in the next place. Every road which has houses on each side of it would require, according to the Board of Health system, three sewers at least: one running under the road to receive its surface drainage, and also to serve as an outfall of the entire drainage of all sorts of the districts higher up; and two other sewers, one on each side, behind the houses. These two latter sewers receive from behind the drainage of the individual houses, and also, I assume, the rain which falls in their rear; they are of pipes commencing with the size of 6-inch diameter, and gradually enlarging to 9-inch and 12-inch, &c., according to the length they run; but I presume they would not be allowed to run for any great continuous length. At each convenient opening, I take for granted, they would be brought round from the right or the left, and connected with the central sewer under the road. This central sewer, before it has traversed any considerable length of the five miles between the water-shed on the margin of the basin of the Thames, and that river, would receive such accessions of sewage and water from the above-mentioned sewers on each side, as well as from the road itself, that it would soon greatly exceed, in magnitude and importance, the side house sewers: of course its size would vary considerably, being small near the water-shed line, and large at its outlet into the Thames; but its mean capacity, or rather discharging power, would require to be about sixty times that of each of the pipe house sewers behind the houses. Its size, at no very great distance from water-shed line, must exceed the capability of pipes, and consequently it must thenceforward be made of brick, and it is necessarily placed under the road, where expense of every kind attends its construction; it therefore constitutes not only the most important, but the most costly part of the entire system of sewerage.

In spite of all the considerations here pointed out, the advocates of the Board of Health system either entirely overlook or make light of this most important sewer. It may, perhaps, be overlooked or made light of in small country towns; in London it must not.

I have spoken of its relative capacity, in comparison with the rear sewers; its average absolute capacity I am not in a position to state; that must depend chiefly on the breadth of the area which it drains. Assuming, for the moment, that all the London sewers could at all times be rendered "self-cleansing" and self-repairing, so as to render it unnecessary for men ever to enter them, then the question of size becomes simply an hydraulic question.

Viewing the existing sewers merely in this aspect, it would appear that, until lately, in determining their sizes, hydraulic science had been exercised either not at all, or very scantily. Some of them are, beyond a question, unnecessarily large; still more of them are too small; the consequence of which latter defect is, that basements are flooded, and property destroyed to a very large amount annually. Some of such sewers, therefore, where they cannot be relieved, will have to be reconstructed of a larger size. In most cases, however, this necessity will be avoided by the construction of the great intercepting sewers recently designed by the engineers of the Commission, which, by dividing the present drainage area on each side of the river into separate zones, will in effect create so many distinct and parallel water-shed lines, in lieu of the present single line, and will on those lines intercept the existing sewers, relieving the lower parts of them which are now gorged by the excessive quantity of sewage flowing from the higher parts. In an economical point of view, this collateral benefit ought not to be overlooked in considering the advantages to be derived from the expenditure of the 3,000,000 *l.*, which the main drainage works will cost.

Of late, in laying down new sewers, hydraulic science has been rigorously applied, with a view to prevent either a defect or an excess in their size. And here, my Lord, I feel bound to observe, that the Commissioners have not accepted the hydraulic tables which are understood to be adopted by the Board of Health; those tables being in a large measure at variance with the results both of science and experience, English as well as Continental, and being such as, if adopted for London, would entail the most serious consequences to the health and property of

Correspondence, &c.

its inhabitants, by giving rise to the construction of sewers too small to answer the purposes intended.

But there is an ulterior consideration which has compelled or induced the Commissioners, in a very large number of instances, indeed generally, to make the sewers larger than purely hydraulic considerations would require; and that is, the necessity or advantage of enabling a man to enter them, for the purpose of cleansing or repairing both them and the house drains. The Board of Health questions, I believe without any qualification, this necessity and advantage. The necessity must be patent in one large class of cases, namely, where the sewers, of whatever construction or material, must inevitably from their position become more or less "sewers of deposit." This happens with reference to the lower parts of all, or very nearly all the sewers of London, the mouths of which are now closed for about eight hours of every tide, or about two-thirds of the entire day. The depths at which they must be kept enable them to discharge into the river only at low water; the rest of the time they are closed up, and therefore stagnant for a considerable length from the river. During the periods of stagnation, deposits unavoidably form and accumulate, which can only be removed by manual labour; flushing would not effect it. Now, the accumulation of deposit, under such circumstances, has nothing whatever to do with the size or material of the sewers; it would equally take place with pipe sewers of the very best material and workmanship. I must, therefore, beg leave at once to dispose of the largest proportion of Mr. Ward's comparison, wherein, as if with a tacit reference to an imaginary similarity of circumstances, he characterizes pipe sewers as "self-cleansing," whilst he asserts that "the big street sewer is, nine times in ten, an elongated cesspool." A second deduction must be made from his comparison in respect of sewers of antiquated form, constructed many years, or even generations ago, and condemned universally by the present generation: such sewers are never made now. A third deduction must be made in respect of those sewers which are subjected to unfavourable circumstances, equally, or in a greater degree, producing stoppages and deposit in pipe-sewers themselves—such as bad workmanship, a bad fall, or a deficiency of water—misfortunes which are always pleaded as excusing a stoppage in a pipe-sewer. There remain only those sewers which are of proper form, well built, with a fair fall, and sufficiently supplied with water. Such sewers rarely accumulate deposit, more rarely than pipe sewers under similar circumstances. I say this advisedly, as being the result of large London experience. When deposit does form in the large brick sewer (and this will now and then happen not only in brick, but also in pipe sewers), the means are at hand of entering it, and removing the obstruction, without the necessity of breaking up the street—a highly inconvenient as well as costly expedient in London.

There are cogent grounds for believing, that a much larger proportion of the London sewers than the Board of Health appear to suppose, would be found not one whit larger than simple hydraulic considerations imperatively demand.

It is only for the remainder that any apology is needed: for those near the river, the justification of their size rests upon the absolute necessity I have before pointed out, of men being enabled to enter and cleanse them; for those higher up, a good reason is offered in the general principle advocated by engineers, that inasmuch as every machine, however perfect, is liable to occasional derangement, each part of it ought, if possible, to be rendered easily accessible for the purpose of repair or adjustment. For a description of the construction of the ordinary modern brick sewer, and of the several purposes for which it is adapted, I beg leave to refer your Lordship to pp. 48-50* of Mr. Bazalgette's Report on Rugby, &c. Against the alleged superior efficiency of pipe sewers, I have to urge the contrary experience of the Commissioners and their officers; but I venture to submit, that the simple consideration of the form of the ordinary sized brick sewer will almost serve to demonstrate its equal, if not superior efficiency. At its lower part it is neither more nor less than an 18-inch barrel, the upper part merely of the circle being removed, and its place supplied by a larger and higher structure. So long as the sewage does not rise higher than the lower part of the circle which is left, the channel is practically the same as in an 18-inch pipe, the same degree of smoothness being soon attained, as shown in Mr. Bazalgette's Report, p. 50.

When

* pp. 205, 206 of this Return.

When the sewage rises higher, the advantage is decidedly in favour of the brick sewer, as the upper frictional surface is partly removed and partly thrown outwards, thereby increasing the hydraulic depth.

I have dwelt thus long on the central sewers under the roads and streets, because it is upon them that the main controversy between the Board of Health and the Commissioners of Sewers really turns. I have endeavoured to show your Lordship, that even assuming the system of combined back drainage to be universally adopted in London, these central street sewers are necessary; that in all roads and streets running towards the Thames, they must, on the average, be of large size, and therefore of brick; and that in those districts at least which border on the Thames, including a large proportion of London, it is absolutely indispensable, and that elsewhere it is convenient, that they be of a capacity sufficient for a man to enter. That the advocates of the exclusive use of small pipe sewers are unconscious of the true importance of the large sewers I speak of, may be attributable to the more narrow and partial views naturally attendant on mere provincial experience.

If the preceding statements be well founded, the question of combined back drainage assumes a very subordinate place in the controversy. In truth, it is not an engineering question; it is a question of mere detail, concerning the mode in which the house drainage should be arranged. The Commissioners have no objection to back drainage abstractedly; their substantial objection is to the dangerous and disastrous notion of attempting to substitute it for the important street sewers already described. They permit it in many cases. Applications for leave to adopt it are made almost daily, and the engineer has very seldom been obliged to refuse permission for its adoption; but in truth, the system is not a favourite one with the more respectable London builders, who prefer a separate drain for each house, running under the latter, and then half way under the street into the sewer in front, just in the manner described and so strongly censured by Mr. Ward. Even in towns drained under the auspices of the Board of Health, it is not always adopted. If your Lordship refers to pages 10 and 15 of Mr. Bazalgette's Report, you will find that at Rugby and Sandgate it has been generally repudiated. In the metropolitan districts the cases where it is most strongly contended for are where speculative builders of an inferior grade run up blocks of small houses in the cheapest and slightest manner that the law will permit, with a view to get them off their hands as soon as they can. Such persons of course struggle hard for the cheapest system which can pretend to the name of drainage, without much regard to its premanent efficiency.

Mr. Ward cites Lambeth-square as an instance where combined back drainage has been beneficially and successfully adopted. It is proper to observe, that the mode of drainage is, in some respects, not accurately described; but such as it is, I beg to state that Mr. Bazalgette considers this to be one of those cases in which he would now recommend that system in preference to separate front drainage. Again, Mr. Ward alleges the expense to have been one-eighth of the cost of separate drainage. A calculation has been made of what each system would now cost; the cost of the combined mode would be to the cost of the separate mode as 1 to about 1¼, instead of 1 to 8. It will not be difficult to show your Lordship that a like misapprehension commonly prevails as to the relative expense generally of the two systems.

The remarks I have already offered with reference to the central or street sewers, must tend to show that such sewers essentially form the basis of both systems, and that the size of those sewers does not depend upon the adoption of either system. We may, therefore, leave them out of the comparison, and contrast only those subordinate sewers and drains which are peculiar to each system.

The separate system then, has, at all events, the advantage of simplicity. It consists of a single house drain running from the back of and under each house, across half the street, to the sewer in front; the length of the drain being about equal to the depth of the house and half the breadth of the street.

The combined system, wherever there is a basement to the house, which is ordinarily the case in London, embraces three lengths of pipe:—1, that portion of the pipe sewer at the rear, which corresponds with the extent of the house in front; 2, a short branch-pipe from the rear of the house to that sewer; 3, a pipe branch from the front of the house, half-way across the street to the sewer

Correspondence, &c.

in front, for the drainage of the front area. This last-mentioned drain is sometimes given in the statements and diagrams of the Board of Health, and sometimes omitted. I must crave leave to insist on its being included as a general rule, where London is in question, because there the houses generally have front areas, and the kitchens must not be exposed to flooding for want of a drain in front. It is true that occasionally, perhaps generally, the Board of Health, instead of separate front area drains for each house, substitute a single line of pipe sewer, running along and parallel to the whole length of the houses, and like the sewers in the rear, joining the central sewer at a certain interval. This, however, will make no material difference in the cost; the only difference will be some diminution or increase of the length of pipe attributable to each house, according as the street happens to be broad or narrow, as compared with the front of each house. In this case, the area drains are dispensed with, and their place is supplied by two additional sewers, making five in all, viz., two pipe sewers at the rear of the houses, two others in front, and one large central sewer under the middle of the street.

Now, comparing the relative cost of these two systems, omitting the common central sewer, and estimating the cost of each by the length of pipes required, it will readily be seen that the breadth of the street, the length and the breadth of each house, as compared with each other, must decide the question. In some cases these elements will give the result in favour of one system, sometimes in favour of the other.

I trust I have now said enough to make it appear at least probable, that the alleged great superiority, in point of cheapness, of the system of combined back drainage, is a mere illusion, arising chiefly from inattention to the indispensable necessity, under any system, for large street sewers; and partly, but in a less degree, from an occasional forgetfulness of the necessity of draining front areas, and in some degree, also, from an unfair comparison of country with London prices, and an oblivion of the costly precautions, repairs, &c., peculiar to the streets of London. Of course I must be understood as speaking only of London drainage; with the drainage of country towns I have no concern.

In considering the relative efficiency of the two systems, it must be borne in mind, that after all, the question turns upon a comparison merely of one set of pipes with another set of pipes; and that the street sewers are not involved in it. Indeed it may be affirmed, that combined drainage must be attended with more hazard, because the sewage, from the time it leaves the house at the rear till it reaches the main sewer in front, traverses a longer and more circuitous route than that which is traversed in the house drains under the separate system. A well-constructed single house drain has been found in practice to be unattended with the nuisance or inconvenience alleged in Mr. Ward's letter; obstructions seldom occur in such a drain, if of sufficient capacity, and when they do take place, they are readily and inexpensively removed from within the street sewer, without tearing up the street or the kitchen floor.

Were the system of combined back drainage to be generally adopted in the denser parts of London, it would frequently become inevitable to pass under some one house the pipe forming the common outlet of the entire block. In addition to the inconveniences enumerated in the same letter, and which are practically found much more serious than the writer represents, the system confers upon the occupant of one house the dangerous and often abused power of cutting off or otherwise prejudicially interfering with the drainage of his neighbours, and the Commissioners experience considerable difficulty in dealing with such cases in the present state of the law, which does not contemplate combined drainage works.

Neither can the Commissioners acquiesce in the expediency of using pipes of so wide a range, in point of size, as that indicated in the same letter. It is found that the 4-inch pipe stops, and the 20-inch pipe breaks. The Commissioners have come to the conclusion that it is not expedient to use pipes smaller than 6, or larger than 12 inches in diameter.

There are, doubtless, many instances in which combined back drainage is for particular reasons admissible; but it is impossible to classify them under general heads for practical application. The Commissioners, some time ago, finding great diversity

diversity of practice upon this, as upon other points, prevailing amongst the surveyors who had charge of the several districts, and thinking it desirable to introduce something like uniformity, laid down certain general rules for the ordinary guidance of their officers, whose discretion they wished to restrain within prescribed limits. But they never intended thereby to tie their own hands, their object being to reserve the exceptional cases for their own immediate judgment, or that of the superior officers of the Commission. The result of their experience is, that in the great majority of instances, separate drainage is the best system for London, especially in the denser parts. In the suburbs principally, but occasionally even in the centre of the town, exceptions are liberally permitted.

The restriction placed by the Commissioners upon the use of pipes for small sewers, except in certain favourable situations, has been based, not upon any objection to pipes abstractedly, but upon their proved insufficiency in point of strength. The manufacture of them, however, has within the last 12 months been materially improved, owing to the regulations of the Commissioners themselves. A year ago, the best pipes procurable were generally too thin to be safely used under roads; they are now better, the Commissioners, after much and pertinacious opposition, having succeeded in inducing the manufacturers to make them of good material and well burnt, $1\frac{1}{4}$ inch thick, and the Lambeth manufacturers are now preparing to make them still thicker. When this is accomplished, it may fairly be anticipated that the use of them may be safely extended to situations where the Commissioners have been hitherto under the necessity of constructing small half-brick barrel sewers. The justification for the restrictions hitherto established in the use of pipes is to be found in a large body of well-authenticated facts. These are derived from various sources, and amongst others, from Mr. Bazalgette's report on the failure of pipes in the Metropolis, referred to by Mr. Ward, the accuracy of which has been most unjustly impugned, both in his letter, and in a Blue Book of last Session, No 1009, being the Further Report of Mr. Austin, Consulting Engineer to the Board of Health, on the Croydon Drainage, laid before your Lordship and presented to Parliament.

Any remaining topics touched upon by Mr. Ward are purely matters of detail. He seems to lay much stress on the use, for house drains, of 4-inch pipes (the size which the Board of Health prescribe) on account of their having a more concentrated flow, and therefore a greater scouring power. The Commissioners prefer 6-inch pipes, because, whilst the difference of cost is very trifling, and whilst the loss of scouring power is practically insignificant, the 6-inch pipes allow more readily of the passage of those innumerable substances which are so often "improperly admitted," and which will continue to be improperly admitted by careless or mischievous persons in spite of better knowledge. The experience of the Commissioners has satisfied them, that where pipes of the smaller diameter are used, stoppages more frequently occur, requiring the taking up and reconstruction of the house drains at a serious cost. Three or four years ago the use of 4-inch pipes was largely enforced in the Metropolis by the then Commissioners, often against the urgent remonstrances of the house-owners. In many instances those pipes have failed; in some instances, after a first failure, they have been reconstructed and have failed a second time, and have ultimately been replaced by 6-inch pipes. It may, perhaps, be alleged that the failures were owing to bad workmanship; no reason appears for attributing them to such a cause, which if it did apply, would apply equally to, and produce a like result in the case of 6-inch pipes, which is not found to be the case.

Much more might be urged in support of the regulations of this Commission; but it has been thought better to draw your Lordship's attention to the more prominent features of the subject, and not to enter into more minute detail than was absolutely indispensable for forming an accurate estimate of the relative value of the systems under discussion.

I have, &c.
(signed) *Richard Jebb.*

Correspondence, &c.

Enclosure with No. 121.

REPORT upon the DRAINAGE and WATER SUPPLY of *Rugby, Sandgate, Tottenham, St. Thomas's, Exeter,* and *Barnard Castle.* By J. W. Bazalgette, Esq., Engineer to the Commission. In pursuance of an Order of the General Committee, dated 22 November 1853.

To the Honourable the Metropolitan Commissioners of Sewers.

Metropolitan Commission of Sewers, No. 1, Greek-street, Soho,
13 February 1854.

Gentlemen,

VISCOUNT PALMERSTON having, on the 8th of November 1853, drawn your attention to three reports which his Lordship had received from the Local Boards of Health of Rugby, Sandgate and Tottenham, upon the works of drainage and water supply which had been executed in those places respectively; and also to a report from Messrs. Dymond & Sons, on the system of pipe drainage carried out in the district of St. Thomas, Exeter—(*see* Appendix), I received your instructions to visit these places, and report upon the works referred to, in pursuance of the following resolution of your general committee of the 22d November 1853:—

Resolution of General Committee.

Resolved,—"That the engineer, Mr. Bazalgette, be directed to visit the several towns and places mentioned in the communications sent by Viscount Palmerston to this Commission, dated 8th November, on the subject of the pipe drainage in such towns and places under the authority of the Board of Health, and report thereon, for the information of this Commission."

On the 26th November his Lordship forwarded to your honourable Board a report received by him from the Local Board of Health at Barnard Castle, on the combined plan of waterworks and pipe drainage adopted there—(*see* Appendix); and I was directed to extend my visit, and report to that place also.

Pursuant to these instructions, I embraced the earliest opportunities that my official duties enabled me to take, to visit the five places before named, having previously, in each case, directed a letter to the clerk of the Local Board of Health who had signed the report to Lord Palmerston, to the following effect:—

Letter to Local Board of Health.

"Sir, "1, Greek-street, Soho-square, 29 December 1853.

"Lord Palmerston having referred your report upon the drainage of Rugby to the Metropolitan Commissioners of Sewers, with a view to ascertain how far the principles of drainage adopted by you are applicable to the metropolis, the Commissioners have directed me (as their engineer), to proceed to Rugby to obtain such information as will enable them to give the subject their fullest consideration. With this view I propose to wait upon you on Wednesday next, the 4th of January; and shall feel obliged if you will then enable me to examine the plans and sections of your sewers, and to obtain such further information as you may be enabled to afford me.

"I have, &c.

"C. E. Wratislaw, Esq., (signed) "*J. W. Bazalgette.*"
"Clerk to the Rugby Local Board of Health."

Information obtained from the Local Boards of Health.

The shortness of time which I was enabled to devote to each place did not admit of my making those general inquiries of the inhabitants which I should otherwise have done; and as pipe sewers do not admit of satisfactory inspection without taking them up again, my information has necessarily been collected almost entirely from the clerks and surveyors to the Local Boards who, whilst they are, from their very position, interested in the success of the works executed under their charge, have no doubt given me a fair outline of the actual state of things; and I feel bound to acknowledge that, from one and all of them, I received the greatest attention, and from most of them a willing reply to all my inquiries.

Inquiry proves the correctness of the Commissioners' regulations.

I am now enabled to report that the result of my inquiries and observations on the application of the tubular system of drainage in these five places affords no proof of its applicability to the metropolis, and no evidence of the cheapness and efficiency of the works at those five places, which should entitle the system to serious attention with reference to the works to be undertaken for drainage in London. In fact, the great difference of circumstances as affecting the drainage of a small country town and the metropolis, in respect of levels, weight of buildings, traffic and trade, quantities of drainage, and the distance it has to be conveyed, the cost of works, inconvenience of obstructions, depths of sewers, nature of soil, conditions of pavements, compensation for loss of trade, &c., payments to gas and water companies for protecting their mains, and various other sources of expense, scarcely leaves room for the comparison of the drainage and cost of the two.

Conditions under which pipe sewers are and are not applicable.

The answers which I have received from the surveyors of the Local Boards of Health confirm the experience of your Commission upon the following points:—1. That, as a general rule, pipe sewers are not adapted to receive the surface drainage from those roads and streets upon which there is any considerable amount of traffic. If there be little or no traffic, there will be proportionately little refuse dropped upon them, and proportionately little

little detritus produced by wear and tear, to be washed by rains into the sewers; and if the surface be paved, there will be less road drift washed into the sewers than there would be from macadamised roads. 2. That pipe sewers are not fitted to receive both house and subsoil drainage. 3. That they require to have a considerable supply of water almost constantly passing through them. 4. That they require, under all circumstances, comparatively steep falls, and to be very carefully laid. 5. That they require to be sufficiently large to compensate for any slight settlement or irregularity in laying, and to admit of the passage of many of those innumerable substances which find their way into them, and which are now recorded "as having caused their obstruction and failure."

Use of pipe sewers advantageous; abuse of them dangerous.

The places where all these requirements are obtainable, even in country towns and villages, are, I fear, not very numerous; and the absence of some or all of them, in various instances, must considerably curtail the application, over any large area, of pipe sewers exclusively. The use of pipe sewers under the conditions above enumerated, is, I conceive, advantageous; and under such conditions I would recommend them, as indeed you actually do apply them; but it is against the abuse of the system of pipe sewerage, by applying it beyond the limits of its capabilities, resulting, as experience shows, in expensive and obstructive failures, that I desire to guard. I shall take occasion to add a few words on this topic at the end of my report.

The five towns named, afford no experience yet.

The Reports to Viscount Palmerston upon Rugby, Sandgate, Tottenham, the parish of St. Thomas, Exeter, and Barnard Castle, would appear to give the result of the experience of the house drainage of those places through pipe sewers for the last two or three years; but upon a more close investigation, it appears that the main sewers only were, during that period, completed; ready to receive, it is true, but not then actually receiving the house drainage, or at most but an inconsiderable portion of it. About two years since the drainage of the houses only commenced being turned into the pipe sewers, and this work is not yet completed; so that, up to the present time, those places, even if no failures had occurred, would afford no real experience upon the subject.

Stoppages may exist for a long time before they are discovered.

The stoppage which I witnessed in one of the main pipe sewers during my visit to Sandgate (the particulars of which I have reported), recalled forcibly to my recollection a fact which I had previously observed, and which is worthy of attention, viz., that a stoppage may exist in one part of a pipe whilst it is clear at a short distance further on; and that, in a porous soil, a stoppage in a pipe sewer may exist for a very long time without flooding the houses connected with the sewer, because the pressure of the sewage forces the clay out of the joints, which then become open, and the sewage oozes away through them into the soil. It is true that in such cases the houses escape being flooded, but it is only because the pipe sewer becomes a permeable elongated cesspool, attended with all the evils which have been so forcibly represented as attaching to the cesspool system. Some years must still elapse before the places now being drained by pipe sewers will afford any just criterion how far these works have been successfully applied. I have not named the various causes of obstruction and stoppage of the pipes which have occurred in the five small places referred to in the following statement, because they are as numerous and various as the stoppages themselves; and if a system of drainage is carried to such an extreme as to be subject to failure from such a variety of causes, it should be adopted with caution, and to a limited extent only. Thus, for instance, whilst an error in levels, or a settlement in the ground to the extent of three inches, would cause the choking-up of half the area of a six-inch pipe, it would only cause deposit to a quarter of the depth of a twelve-inch pipe, and would be scarcely perceptible in the invert of a large brick sewer. Sewers are, moreover, required to carry off many solid substances, and if these are excluded by contracting the inlets to the drains, obstructions and floodings of the surface increase proportionately, and, to a similar extent, the sewers cease to remove the town refuse.

Cost of draining by pipe sewers.

Economy has been urged in favour of the adoption of the tubular system in preference to the construction of large brick sewers. Upon this part of the question it is only necessary here to observe, that as an improved water supply is essential to keep a system of pipe sewers clear, the cost of the water supply must be considered in connexion with that of the sewers; and, as pipe sewers do not provide for surface or subsoil drainage, together with house drainage, their cost must not be taken as the total cost of the entire drainage of a town. There must be added the cost both of constructing, and of maintaining, and repairing the surface and subsoil drains, without which the drainage of the town is manifestly incomplete. I shall hereafter have occasion to offer some remarks upon the very dissimilar circumstances in which London and a small country town are placed, occasioning, not only a difference in the kind of works proper for each respectively, but also in the cost where the works are of the same nature.

I now beg to submit a statement of the result of my inquiry in each place, which will suffice to call your attention to the varied circumstances and conditions which control the engineer in his selection of a mode of draining any particular place, and which exclude the universal adoption of one patent rule of drainage for all places indiscriminately.

RUGBY DRAINAGE.

Population and area.

Rugby contains a population of about 8,000, and about 1,100 houses.

General description.

The town rises with considerable inclination from the river Avon, which is the outfall for its drainage. There is but a small amount of trade carried on there, and the principal traffic is between the school and the railway station.

Correspondence, &c.

The resident population is of a higher average of respectability than most provincial towns of similar population.

Original drainage.

The town was originally provided with brick sewers, which are still in use, to carry off the surface and subsoil drainage; the house drainage having been generally conveyed into cesspools.

Sewers provided by the Local Board of Health.

For the reception of house drainage, the Local Board of Health have since constructed pipe sewers in conjunction with waterworks. These sewers, as in all the other towns which I have visited, are divided into public and private works; but there is no very clear distinction of what constitutes the termination of the latter and the commencement of the former; so that the length of the private sewers, and their cost to the persons required to construct them, is very various. The public sewers, however, provide outfalls for the sewage when it is brought into them by the private sewers and drains, but they do not receive any sewage until the private works are executed. These latter connect the houses with the public sewers, and deliver the sewage into them. It is also difficult, where combined drainage is adopted, to distinguish between drains and private sewers; and as both are executed at private cost, I have not attempted this further classification, but have, in all cases, considered the private works, whether sewers or drains, under one head.

Public sewers for house drainage.

The public sewers, and the main lines of water supply, were completed in January 1852, out of the public rates, by the Local Board of Health, according to the design and under the supervision of Mr. Rammell, one of the Inspectors of the General Board of Health.

The completion of the public sewers may be considered, practically, the commencement of the drainage of the town. The preliminary Report on the sanitary condition of the town was made in February, 1849.

Private sewers and house drainage works.

The construction of private sewers and drains, and the laying on of water to the houses, are executed by the owners of the houses at their own cost, either voluntarily, or under compulsory powers enforced by the Local Board of Health as opportunity offers. This portion of the work cannot be pressed forward so rapidly as the public sewers. Its progress

Progress of house drainage.

must necessarily be slow, and some time must elapse before it is completed. Thus the number of houses drained into the sewers was, on the 30th August, 1852, only 258; in May, 1853, 488; and at the present time from 700 to 750, or about two-thirds of the entire number in the town.

Description of pipes.

The private sewers and drains are composed of stoneware socket pipes, of London manufacture, the joints of which are formed in clay, it having been found that cement is liable to produce stoppages in the house drains by projecting and hardening inside the pipe.

Sizes and depths.

The public sewers are laid at an average depth of about 8 feet. They vary from 6 to 22 inches in diameter. The private sewers and drains generally vary from 4 to 6 inches in diameter.

Inclination.

The inclinations of the public sewers are upon the average remarkably favourable, being about 1 in 50 or 60. The best inclination is 1 in 19, and the worst 1 in 324. The inclinations for the private sewers and house drains are generally steeper, not less than 1 in 60.

The pipes have been laid down generally in the public thoroughfares; the road drainage is carried off mainly by the old brick sewers originally constructed in the town for that purpose; but there have been about 16 road gullies connected with several of the new branch sewers; and the outfall of the old surface drains is connected with the new pipe sewers near the outfall of the latter.

Admission of surface drainage into pipes.

One of the branch sewers, which is laid at an inclination of 1 in 200, now receives as many as five gullies. This branch has not been opened for some months; and as the condition of pipe sewers can only be fully ascertained by taking up the whole length of sewer (because the depth of deposit in them varies considerably at different points), it is impossible to say what amount of deposit this sewer may now contain. Although in one respect it is advantageously circumstanced, receiving the drainage from a road subject only to a small amount of wear and tear, experience on this point leads me to anticipate that no description of gully or trap will suffice to prevent the road drift, whilst held in suspension in the water, from being carried into the sewer, and, with no better inclination than that above named, afterwards accumulating in it, and ultimately becoming a source of inconvenience and expense.

Combined back drainage not adopted.

Junctions have been left in the main sewers for each separate house drain; and separate drainage for the houses has been generally adopted in preference to combined back drainage, because it was found that the latter system interfered considerably with the rights of private property, and it was impossible to get the owners of different properties to agree to the united execution of combined works.

Ventilation of sewers.

The ventilation of the sewers has been effected where practicable, by the connexion of the rain-water pipes from the roofs with the sewers.

Stoppages in pipes.

The Surveyor of the Local Board of Health attaches great importance to the existence of abundance of water, and to the joints of the drain pipes being made water tight; and he attributes most of the stoppages which have occurred in the house drains to defects in this latter particular, whereby the water soaks away through the joints, leaving the solid portions to deposit in the sewer or drain. There have been a few cases of breakage in the main sewers, stated to have been caused by defects in the workmanship,* and stoppages have resulted therefrom; but these, it is stated, have not been necessarily incidental to this application

* I have since been informed by respectable authority, that a deputation who visited the Rugby Works found some of the main sewers broken, and being taken up and relaid with other pipes.

application of pipe drainage. On the other hand, the amount of drainage which has from time to time been turned into these sewers is not yet sufficient in quantity, nor has sufficient time yet elapsed, to afford any decisive proof of their suitability.

Application of sewage as manure.

A contract for the use of the sewage of the town for 20 years has been made with the Local Board. The contractor pays the Board 50 *l.* per annum for the sewage, but he is not required to use more of it than he wants for his own purposes; and the residue passes into the river.

A six-horse engine and a reservoir have been constructed, with a view to distribute the sewage water upon the land of this individual, in the shape of liquid manure.

Water: source of supply.

The water supply is obtained from the drainage of a gravel bed, about a mile from the town. The present quantity supplied has, however, been found insufficient for the requirements of the town, and additional channels for collecting the water from a more extended area are about to be constructed.

Reservoir and engines.

The water at present collected is conveyed by stone-ware pipes, 7 inches in diameter, into a reservoir capable of containing about 200,000 gallons. An engine of 10-horse power is employed to raise it to a height of 110 feet, into an upper reservoir capable of holding 50,000 gallons; but a duplicate engine is still required, and will have to be provided to secure the certainty of the water supply at all times. The quantity of water now passed through the sewers is about 80,000 gallons per day.

Constant supply.

The water is laid on upon the principle of constant supply, and has been exhausted three or four times by the carelessness of persons leaving the taps open. A foreman goes round every morning to examine the condition of the water-taps and drain inlets; and this strict supervision is found to be of the utmost importance to the successful operation of these works.

Depth of pipes and the frost.

The water pipes are laid at a depth of not less than 16 inches below the surface; but at the time of my visit many of the water-closets were frozen up.

Cost of water supply and sewers.

The cost of the water supply has been about 10,000 *l.*, exclusive of the extension now proposed, or the additional engine alluded to. That of the public sewers has been about 5,000 *l.* In these two sums are included the engineer's charges, 1,090*l*., but they do not include the cost of the preliminary inquiry and report. The cost of the town survey (814 *l.*) is not yet paid.

Cost of private works.

The cost of the private works, including the laying on of water and destruction of the cesspools, has varied from 5 *l.* to 50 *l.* per house, according to the length of sewer and drain required to be constructed by the owner.* Now, assuming the average to have been only 8 *l.* per house, the cost of these works would amount to 8,800 *l.*; so that the drainage and water supply of the town when completed, would, upon this supposition, amount to somewhere about 25,000 *l.*, taking into account the cost of the preliminary inquiry, of the extension of the means for collecting water about to be commenced, and of the additional engine power before alluded to, but making no provision for the subsoil drainage, and but little provision for the surface drainage, for the removal of which, mainly, the old sewers are retained. The estimate, therefore, would stand thus:—

	£.	s.	d.
Present waterworks - - - - - - - -	10,000	–	–
Public pipe sewers - - - - - - - -	5,000	–	–
Private works - - - - - - - -	8,800	–	–
Additional engine, and extension of waterworks, say -	1,200	–	–
TOTAL - - -	£. 25,000	–	–

The cost of pumping is about 200 *l.* per annum.

Rateable value and rates.

The rateable value of the property included in the drainage area of Rugby, is about 28,000 *l.*; and a special district rate of 10 *d.* in the pound per annum is raised to pay off the cost of public works, 1,000 *l.* of which is already liquidated. For the supply of water, a further rate of 4 *d.* in the pound is charged to all consumers, in addition to the sum of 2 *s.* 6 *d.* per annum for every horse, and 1 *s.* 6 *d.* for every cow. Besides the above, there is a general district rate, out of which are defrayed the charges for supervision and repairs to sewers, as well as some other expenses; and, on the other hand, this fund is credited with the rent of 50 *l.* paid for the use of the sewage.

Supervision and repair.

The cost of earthwork for laying the sewers, including the removal and re-laying of the pavements, and all other incidental expenses, has been about 1 *d.* per foot run for every foot in depth, or 10 *d.* per foot lineal for a sewer laid 10 feet deep; which sum would not cover the cost of merely repairing the streets over such a work in London.

The cost of the pipes delivered are given in the Table subjoined.

I visited this town on the 5th January 1854, and am indebted for the foregoing information to Mr. Phillips, the Surveyor to the Local Board of Health, who appears to have devoted great attention to the subject, and to have used every effort to make the works under his charge successful in their operation.

RUGBY

* On the 21st ult. I applied to the Surveyor for more definite information on this and some other points, but I have received no answer to my letter. J. W. B.—13th Feb.

Correspondence, &c.

Rugby Improvement Works.

Schedule of Prices for Pottery Drain Pipes.

The Prices were much lower when this Work was executed, than at the present time.

Sizes.	Straight Pipes.	Curved Pipes.	Taper Pipes.		Junction Pipes.	
Internal Diameter.	Price per Pipe.	Price per Pipe.	Internal Diameter.	Price per Pipe.	Internal Diameter.	Price per Pipe.
Inches.	*s. d.*	*s. d.*	*Inches.*	*s. d.*	*Inches.*	*s. d.*
21	6 –	9 –	21 to 18	6 6	12 on 18	10 10
18	4 9	7 –	18 to 15	5 1	12 on 15	7 2
15	3 7	4 9	15 to 12	3 11	9 on 18	9 7
12	2 2	3 4	12 to 10	2 5	9 on 15	6 –
10	1 8	2 5	10 to 9	1 10	9 on 12	4 2
9	1 4	2 1	9 to 8	1 6	9 on 10	3 –
8	1 2	1 10	8 to 7	1 4	7 on 9	2 1
7	1 –	1 7	7 to 6	1 2	7 on 8	2 1
6	– 9½	1 4	6 to 5	– 11	7 on 7	1 10
5	– 8	1 2	5 to 4	– 10	6 on 10	2 8
4	– 7	1 –			6 on 6	1 2
3	– 6	– 9			4 on 5	1 1
					4 on 4	– 11
					3 on 4	– 11
					5 on 7	1 8
					5 on 5	1 1
					6 on 7	1 10

Charge.

	s.	*d.*
3-inch Syphon Traps	2	–
4 - Ditto	2	6
5 - Ditto	3	–
6 - Ditto	4	–
7 - Ditto	5	–

SANDGATE DRAINAGE.

General description.

Sandgate is a remarkably healthy and pretty village, situated in a bay upon the sea coast, about a mile and a half west of Folkestone.

It stands mainly upon a single line of road, running parallel with, and close to, the sea-shore at the foot of a range of hills, which rise precipitously from the sea, and prevent the extension of the houses, excepting along the line of the shore. The beach, as well as the subsoil of the village, consists of shingle. The place contains at the present time about 330 houses, and a population of about 1,400, which latter is considerably increased during the summer months by visitors for sea bathing, upon whom the village is mainly dependent for its support.

Population and business.

Drainage surface and subsoil.

From its position, resting upon a sea-beach shingle, it required but little artificial drainage. Nature has provided the most perfect subsoil drainage, and all liquids percolate rapidly through the shingle into the sea. The present surface drainage has long existed in the shape of a few covered drains and open cuts, which admit of the rapid discharge of surface waters to the beach.

House drainage divided into two classes.

The house drainage is divided into two classes, public and private; the former being executed out of public rates, and the latter at the cost of private individuals.

House drainage—public sewers.

The public sewers and the water supply were executed under the General Board of Health by their Inspector, Mr. Rammell, who had also made the preliminary inspection and report to that Board in 1849. The public works were completed by him by the end of July 1852. These works are not designed or executed so as to be applicable to any considerable extension of the village.

House drainage—private sewers and drains.

It appears that no plan of the mode of executing the private sewers and drains was furnished by Mr. Rammell; but the Local Board were allowed to require the execution of these works in the manner dictated by their own judgment, as opportunity offered for calling upon the householders to perform the work; and the surveyor to the Local Board informs me, that up to the present time about 270 houses are drained into the sewers, but he could not

Correspondence, &c.

not inform me what numbers had been drained at any intermediate periods since the completion of the public works.

The private sewers and drains have been laid as much as possible in the public ways; and separate drainage for the houses has been adopted in preference to combined drainage, because it was found to be very difficult to get the owners of property to agree to carry out the latter, and the system of draining the houses separately was in general more satisfactory in the result. Separate drainage through the public ways.

The sizes of the public sewers vary from 6 inches to 12 inches in diameter, and their inclinations from 1 in 6 to 1 in 320. Sizes and inclinations of public sewers.

The surface drainage of the roads has not been admitted into the pipe sewers. From some courts it has been admitted; but the surveyor and clerk to the Local Board express strong objections to this, as tending to create deposit and stop up the pipes. The rain-water from the roofs of houses is generally admitted as tending to cleanse the pipes. Separation of house and surface drainage.

The pipes are of stoneware, with sockets, from London, the joints of which are made of clay. Form and material of pipes.

About a year ago, three of the stack pipes from the roofs of houses were connected with the pipe sewers, in order to provide for the ventilation of the latter, as recommended by the engineer. One of such pipes, however, caused a nuisance to the adjoining house, and was afterwards trapped, whereby it ceased to act as a ventilator. Ventilation.

Three new ventilating shafts have lately been carried up the sides of the houses in places not likely to create a nuisance, and the Local Board propose shortly to construct four more of the same kind.

The depth of the sewers averages from 5 to 6 feet below the surface. Depth of sewers.

The public sewers consist chiefly of four lengths of pipes, forming one line, laid under the north side of the main street. These lengths severally are of 6 inches diameter at the upper end, and increase to 9 inches; they are arranged in two pairs; the lengths of each pair fall from opposite directions and meet at a certain point, whence they discharge through a common outlet, at right angles with them, into the sea. General description of main sewers.

These lengths measure respectively 583, 320, 203 and 330 yards. The first portion of the outlet for the first two lengths is a 12-inch stoneware pipe, 73 yards in length: total, 1,509 yards of stoneware pipe.

The first two lengths discharge through a 12-inch pipe into a large egg-shaped brick reservoir sewer, 7 feet 6 inches by 5 feet, and 60 feet long.

The reservoir sewer is below high-water, and stores the sewage for about three hours per day: it is furnished with a flap and iron discharge-pipe to low-water. The other two lengths of main line discharge into a separate iron pipe laid at right angles to them and across the beach to low-water.

The remainder of the public sewers consist of short branches falling with good inclinations into the above four lengths of main line.

The general inclination of the main line varies from 1 in 240 to 1 in 320, with the exception of about 253 yards at the eastern end of the eastern length, the inclination of which varies from 1 in 15 to 1 in 25, and of about 118 yards more at an inclination of 1 in 120. Main lines of sewers; general inclination.

Stoppages having occurred in the three eastern lengths of main line, about 766 yards were taken up and relaid about 12 months ago. The pipes, it is said, had not in the first instance been laid at sufficiently true inclinations, and the surveyor has not since observed more than 1½ inches of deposit in them. Pipe sewers relaid.

Just before the time of my visit, the surveyor to the Local Board had had occasion to open the remaining or fourth length of main line to connect a house-drain with it, when he discovered that it also was stopped up. Stoppages in pipes.

It is here worthy of remark, that in this, as in most porous soils, the stoppage was not discovered until the surveyor had occasion to make a fresh connexion with a house-drain, because the sewage from the four houses draining into this length of main sewer had filtered away through the joints of the pipes into the shingle, and had not, therefore, backed up into and flooded the houses. This is a strong indication that many similar obstructions may exist for years in pipe sewers, under such circumstances, without being discovered; the soil-drainage, in such cases, saturates the ground just as much as if it were discharged into cesspools, and the sewers fail to perform the duty for which they were constructed, viz., the removal of the sewage. Stoppages in pipes may exist without being discovered.

When I visited the works the surveyor had excavated the ground down to the pipes, for a length of about 16 yards, to discover the position of this stoppage, but without success. A flushing-pipe was then opened about 34 yards higher up the line of sewer, and water was turned into it by a hose from the reservoir, elevated about 85 feet above the level of the pipes. This stream of water was unable to force its way through the stoppage. During this operation I expressed my apprehension that the water would rise into the basements of the adjoining houses if not immediately turned off, but instead of doing so, as must have been the case in a retentive soil, it forced its way through the clay joints of the pipes into the shingle, and immediately drained away, as the sewage from the houses had previously done. Mode of removing stoppages.

I left the cause and position of this stoppage unascertained, with 16 yards of trench open, and a further length of 34 yards of sewer to be opened and relaid should the workmen not Position of stoppage not discovered.

Correspondence, &c.

not be so fortunate as to hit upon it within a shorter length.* So that, after deducting the 253 yards, which have a fall of from 1 in 15 to 1 in 25, it appears that out of the remaining aggregate lengths of main line, amounting to 1,256 yards, 816 yards, or about two-thirds of the whole length, have already once failed and been relaid.

Failures always attributed to defective workmanship.

This cannot be considered a very happy illustration of the successful working of pipe sewers, and although it will be urged that these stoppages were occasioned by defective levels or workmanship, it should be remembered, that when 9-inch pipe sewers are laid, excepting in short lengths and with steep falls, so nice an amount of accuracy in the levels and workmanship is essential to secure efficiency as to be scarcely attainable in practice; but even if this theoretic perfection should, in the first instance, be attained, the work is liable afterwards to be deranged by partial settlements and other unavoidable causes, any one of which is sufficient to produce the failure and inconvenience which I witnessed during my short visit to Sandgate.

Probable effect of a better application of the sewers.

It appears to me, that in this village, had the main line of pipe sewers been cut up into shorter lengths, and in some instances increased in size, so as to allow an extension and to provide against the casualties to which I have alluded, they might have been carried with better inclinations and more directly into the sea, and would then have answered their purpose much more satisfactorily.

Stoppages in pipe drains.

About a dozen stoppages in pipe drains, and in the minor branches of sewers, were reported to me, and I am informed that they all arose from what are termed "avoidable causes," such as the introduction of improper substances.

Breakage.

There was a short length of 12-inch pipe laid in the beach at a depth of about 9 feet, which, when opened, was found broken, and thicker pipes have since been substituted.

Water supply.

The water supply is obtained by laying rubble stone collecting drains into the sand bed in the range of hills forming the northern boundary of the village, and thus collecting the

Reservoirs.

drainage into two covered reservoirs. The western one is elevated 83 feet above Ordnance datum, and the eastern one 67. Each of these reservoirs is capable of containing about 20,000 gallons.

A few houses too high for water supply.

A few of the houses are too high to be supplied with water from these new works, and these houses are exempt from the water rate.

Nominally a constant supply.

The supply of water is upon what is termed the "constant supply" system; but there has been so much waste from leaving the taps open, that the surveyor has been obliged to turn off the water from the mains every night for some months past, to give a sufficient supply during the day time, so that during the night, the houses having no cisterns are left entirely without water, instead of having a "constant supply."

Quantity of water used.

When water is sufficiently abundant it is occasionally passed through the sewers, to cleanse them, and sometimes about 25,000 gallons a day are passed from the reservoirs through the houses. The average was stated to me as amounting to about 20,000 gallons per day, but this I should imagine to be a high estimate.

Water mains.

The drain-pipes are laid upon one side of the main road, and the water-supply pipes on the other.

Quality of water.

The water is soft and of good quality, but in draining from the sand-bed it carries with it a large quantity of sand, which collects in the reservoirs to the depth of about five inches in six months. The reservoirs are generally cleared out twice in the year. This sand also collects in the water mains, and when the water is first turned on, or is drawn off in large quantities for watering the roads, it carries with it the sand, and renders its delivery turbid and impure, and the occupiers of the better houses generally filter this water themselves before drinking it.

Failure in supply.

From my own observation on this point, I entertain very serious apprehension that the rubble stone collecting or gathering drains will, in the course of time, become filled with sand, and that the quantity of water supplied will proportionately fall off and become insufficient.

Cost of works: private.

The average cost of the private works has been from 7 *l.* to 8 *l.* per house; but, in some few instances, the cost of the drainage alone amounted to seven guineas per house. Taking the average at 7 *l.* 10 *s.* per house, these works, when completed, will amount to 2,475 *l.*

Cost of works: public.

The public works cost,

	£.	s.	d.
For water supply, about - - - - -	2,266	–	–
And for drainage works - - - - - -	1,000	–	–
TOTAL - - -	£. 3,266	–	–

This sum does not include the cost of the preliminary inquiry (170 *l.*), nor the cost of the town survey, which has not yet been charged. But it includes the sum of 213 *l.* paid for the previously existing water-supply pipes which are now used, and 100 *l.* premium to the owner of the former water supply, and the engineer's charge of 314 *l.*, the clerk of works' charge of 90 *l.*, and the legal expenses. So that the actual cost of these works to the place will

* On the 6th of February I received a note from the clerk to the Local Board of Health, expressing satisfaction at having to inform me that this stoppage was occasioned by the shingle having got into the pipe.

will amount to somewhat about 6,000 *l.*, including the survey and preliminary inquiry, but not including the surface or subsoil drainage. The estimate, therefore, will stand thus :—

	£.	*s.*	*d.*
Water supply	2,226	–	–
Public sewers	1,000	–	–
Private works	2,475	–	–
Preliminary inquiry	170	–	–
Survey, say	89	–	–
TOTAL	£. 6,000	–	–

The contractors' bill for relaying the pipes last year has been sent in to the Local Board, and amounts to 77 *l.* 13 *s.*, being only about 7½ *d.* per foot lineal of sewer relaid, but this account is at present unsettled. There have also been two small extensions of the public sewers since executed by the Local Board; and the works now in progress, of removing the stoppage and relaying the pipes, are not included in the foregoing amount.

The rateable value of the property included in the drainage area is from 3,500 *l.* to 4,000 *l.* Rate.

The water rate amounts to 1 *s.* in the pound per annum, the sewers rate to 6 *d.* in the pound per annum, and the charges for supervision and office expenses, &c. is paid out of the general district rate, amounting to from 1 *s.* to 1 *s.* 4 *d.* in the pound, which rate also includes the lighting rate of about 6 *d.* in the pound.

I am indebted to Mr. Pledge, the clerk to the Local Board, and Mr. Harman, their surveyor, for having so readily placed me in possession of the facts which I have now the honour to report for your information.

I have been favoured with the following lists of prices :—

SANDGATE LOCAL BOARD OF HEALTH.

Contract Prices for covered Reservoirs.

	£.	*s.*	*d.*
Excavation :			
Earthwork, digging, and throwing out ground, wheeling and filling in, per cubic yard	–	–	9
Concrete :			
Concrete foundation, per cubic yard	–	5	–
Brickwork :			
Brickwork in mortar, per cubic yard	1	–	–
Ditto – cement	1	5	–
Stonework :			
York flags, 3 inches thick, per foot super.	–	–	10
Woodwork :			
Oak door, as described in specification, hung in oak frame, with proper fastenings, per foot super.	–	4	–

SANDGATE LOCAL BOARD OF HEALTH.

CONTRACT PRICES for HOUSE SERVICE PIPES, laid complete, including the providing of Pipes, the excavation of Ground, the laying and jointing of Pipes, the filling-in and punning of Earth and removal of surface Soil; the making good of Paving, and the performance of every thing necessary to render the work complete.

Diameter of Pipeage.	Price per Foot lineal, at undermentioned Depths below Surface.								
	2 feet.	3 feet.	4 feet.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet.	10 feet.
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
3 inches	– 7	– 7½	– 8½	1 –	1 2	1 4	1 5	1 6	1 7
4 inches	– 8	– 8½	– 9	1 1	1 3	1 5	1 6	1 7	1 8
5 inches	– 9	– 9½	– 10½	1 2	1 4	1 6	1 7	1 8	1 9
6 inches	– 10	– 10½	– 11½	1 3	1 5	1 7	1 8	1 9	1 10

Correspondence, &c.

Junction Pieces extra:

		s.	d.
3-inch on 3-inch diameter	each	–	4½
3-inch on 4-inch - ditto	„	–	5½
4-inch on 4-inch - ditto	„	–	5½
4-inch on 5-inch - ditto	„	–	6½
4-inch on 6-inch - ditto	„	–	7½
5-inch on 5-inch - ditto	„	–	6½
5-inch on 6-inch - ditto	„	–	7½

Sink stones, connected with drain and fixed complete, 3 *s.* each.

Curved Pieces extra:

		s.	d.
3-inch diameter	each	–	4½
4-inch - ditto	„	–	5½
5-inch - ditto	„	–	6½
6 inch - ditto	„	–	7½

Syphon Pieces extra:

3-inch diameter	each	1	6
4-inch - ditto	„	2	3
5-inch - ditto	„	2	10
6-inch - ditto	„	3	4

Water Supply.

Contract Price for Pipeage, laid or fixed complete, including the providing of Pipes and all connecting Pieces, the excavation of Ground, the laying, fixing, jointing and connecting of Pipes, the filling-in and punning of Earth; the making good of Paving, the restoring of Brickwork, Plastering and Woodwork, &c., the removal of Rubbish, and the performance of everything necessary to render the work complete.

Pipeage laid underground:

	Per foot run. s.	d.
½-inch galvanized wrought iron pipeage	–	6
¾-inch - ditto	–	6½
1 - inch - ditto	–	7½
1¼-inch - ditto	–	10¼
1½-inch - ditto	1	–

Pipeage fixed above-ground:

½-inch galvanized wrought iron pipeage	–	4½
¾-inch - ditto	–	4¾
1 - inch - ditto	–	6
1¼-inch - ditto	–	8½
1½-inch - ditto	–	10½
¼-inch tin (block) pipeage	–	3½
⅜-inch - ditto	–	4
½-inch - ditto	–	4½
⅝-inch - ditto	–	6½
¾-inch - ditto	–	9
1 - inch - ditto	–	10

Lengths under 2 feet long, to be charged as 2 feet of pipe.

Stop Cocks provided and fixed complete, including Key.

		s.	d.
¾-inch	each	4	6
1 - inch	„	6	–
1¼-inch	„	9	6
1½-inch	„	12	–

Bib Cocks provided and fixed complete:

		s.	d.
¼-inch	each	3	9
⅜-inch	„	4	3
½-inch	„	4	9
⅝-inch	„	5	3
¾-inch	„	6	6

Water-closet Apparatus provided and fixed complete, including pan and trap, contrivance for flushing, valve and handle, and connecting pipeage, 1 *l.* 2 *s.* each.

TOTTENHAM DRAINAGE.

General description.

Tottenham is about five miles from London, in a north-easterly direction. It consists mainly of a street, built on a wide road, formerly a great coach thoroughfare to the northern and eastern counties, with detached villa residences on either side.

Surface and subsoil.

The general surface of the ground has a gentle fall towards the valley of the River Lea. The subsoil of the northern portion of the town is gravel, and of the southern portion London clay.

Drainage provided before the new works.

Its surface and subsoil drainage was provided for by brick sewers, which have been many years constructed, and which are still maintained for this purpose. The house drainage was conveyed into cesspools with overflows into the adjoining sewers or ditches.

Brought under the General Board of Health.

In May 1849, Mr. W. Ranger, one of the inspectors of the General Board of Health, made his report to that Board upon Tottenham, and a rated district was formed, containing 2,000 houses and a population of 11,000 persons, with a local board of health. The plans of their engineer, Mr. J. Pilbrow, for the water supply and house drainage of the town, were submitted for the approval of the General Board on 1st October 1850, and received its sanction on the 22d August 1851.

House drainage works divided into public and private.

Here, as elsewhere, the new sewers are divided into two classes, public sewers executed at the public cost, and private sewers (including also house drains) executed at private cost.

Progress of works.

The public works of a portion of the district were completed about September 1852. The private works or house drainage commenced about that time, and the number of houses connected

connected with the sewers was, in February last, about 400, in August last about 1,100, and at the present time 1,800; so that, in point of fact, Tottenham does not afford a longer experience of the working of this system of sewerage than the other places which I have lately visited. Correspondence, &c.

The works, with few a exceptions, have been executed as originally designed by Mr. Pilbrow; and the only alteration of importance which he was required to make by the General Board of Health, was the reduction in diameter of his outlet sewer, from 21 to 18 inches; but as the drainage of the district is rapidly extending, there are good grounds for believing that the outlet will have to be taken up, and a brick sewer of larger dimensions substituted for it.

The main sewers are laid generally under the footpaths of the public thoroughfares, and vary from 7½ to 18 inches in diameter, but Mr. Pilbrow would not again use pipe sewers larger than 15 inches in diameter, and those only under peculiar circumstances; beyond that size he prefers brick sewers, upon the score of both economy and efficiency. Main sewers: size and inclinations.

The inclinations of some of the main lines are flat; for instance, commencing with the outfall and going upwards, they are as follows:—

DIAMETER OF PIPE.	RATE OF FALL.
18 inches	1 in 1,062 to 1 in 659.
15 „	1 in 635.
12 „	1 in 635.
9 „	1 in 340.

The greatest depth below the surface at which these sewers are laid is 13 feet, and the average depth is about 7 to 8 feet. Depth.

The pipes are circular stoneware socket pipes, formed with a bell mouth, so as to prevent the shoulder of one pipe projecting beyond the adjoining pipe, in case of any settlement of the ground; and this appears to me a decided improvement on the usual form. The joints are made with Portland cement, and Mr. Pilbrow attaches great importance to this mode of jointing, because Portland cement, taking a long time to set, to some extent adapts itself to any settlement of the pipes which may happen whilst the ground is soft. Description of pipes.

Flushing shafts have been constructed at the heads of the branch sewers, which are flushed out every two or three months; and there are four man-holes or shafts constructed for the purpose of inspecting the pipes; but they show the condition of the pipes only at those particular points at which they are fixed, and are no indication of their condition at any other points, as I have frequently had occasion to observe before. Flushing and inspecting shafts.

Provision for the ventilation of the sewers has been made by connecting the stack pipes of the houses with the sewers, or by carrying up a shaft in the centre of a garden wall, unknown to the owner, or, where the sewer crosses a field, carrying up pipes by the side of trees; indeed, when sewers are constructed in districts not closely peopled, many opportunities of obtaining ventilation present themselves which are not to be found in a crowded city. Ventilation.

The surface drainage has not been admitted into the sewers, and Mr. Pilbrow expresses a very decided opinion that, if they were admitted, they would very soon become entirely choked up. Surface drainage not admitted.

The outfall is at present into the Mosell, and thence into the River Lea, the water of which is supplied below this point by the East London Waterworks Company to the London consumers, upon whom a great evil is thus inflicted. The Local Board are alive to this point, have purchased land for the construction of sewage works, and are now in treaty with a contractor for undertaking, free of cost to the Board, the purification of the sewage, of which he is to have free use for 21 years. The process of precipitation proposed to be adopted is known as Higg's process, now used at Cardiff gaol. If the agreement renders compulsory, under penalties, the purification of the sewage at all times, and this obligation be strictly enforced, the result promises to be satisfactory. Outfall.

Back combined drainage has been generally adopted for the private sewers and house drains: the latter vary in diameter from 4 to 6 inches, and their average inclination is about 1 in 50 or 60. In some cases the 6-inch pipes have been laid down for a length of 600 or 700 feet, at an inclination of 1 in 200, but I am informed that no stoppages or breakages have yet taken place. Private sewers.

The cost of the private works is said to average about 8 *l.* per house, but they have in some instances amounted to 60 *l.* or 70 *l.* I called upon a friend resident at Tottenham, who put into my hands a bill he had just received from the Local Board for private works done to his house, amounting to about 40 *l.*, the particulars of which I have given at the end of this Report, as it affords a better general idea of the work performed and the prices charged, than I can otherwise present. There are numerous cases in which there is but one water-closet to three or four houses, but to several houses of the better class there are two water-closets. Cost of private works.

The water is obtained from two bore holes, one of 12-inch bore, sunk 100 feet into the chalk, and one 10-inch bore sunk through the gravel down to the surface of the chalk. The water from these flows into a subterranean reservoir, whence it is raised by two 6-horse engines to a reservoir 100 feet above the town, capable of containing 100,000 gallons, or barely Water supply.

Correspondence, &c.

barely one day's supply. A further quantity of water, about equal in amount, gains admittance into the sewers from springs in the gravel; so that, on the average, about 200,000 gallons of water are passed daily through the sewers. The supply pipes to the houses vary from 1 inch to ¾ inch, and the water is laid on upon the system of constant supply; but Mr. Pilbrow's arrangement in this respect, as in many other details, are superior to those which I have witnessed in any of the other towns included in this Report, and it is only due to him to state that they exclusively originate with himself.

Mr. Pilbrow's preventor.

Mr. Pilbrow has invented what he terms a "preventor," consisting of a stone or gutta percha ball, which, when a tap is opened, is forced up with the rising stream of water, and stops the orifice after about a pailfull of water has passed through it; and the ball will not then admit of any more water passing until the tap has been turned back, and the ball allowed again to fall to the bottom of the chamber. This simple apparatus prevents the great waste of water which is complained of in other places where the constant supply system has been adopted; and the quantity and force of the flush of water here used are vastly superior to what I have witnessed elsewhere, and tend materially to mitigate the evils attendant upon too extensive an application of small pipes.

Cost of works.

	£.	s.	d.
The cost of the public works, irrespective of extensions, which will hereafter become necessary, and irrespective also of the preliminary inquiry, survey, &c., have amounted to - - -	10,000	–	–
The private works, taken at an average of 8 *l.* per house, would amount to - - - - - - - - - -	16,000	–	–
	£. 26,000	–	–

The public works at Tottenham were executed at very low prices; they could not now be done for the same money; but they could always be done at a very much less cost there than in the streets of London.

The following give a fair average of the contract prices at which these works were executed, the greater portion of the sewers being laid under the footpaths. When laid under roads, they cost rather more, and when in fields rather less.

Pipes laid in footpaths and court-yards, every expense included, except the cost of the pipes:—

DIAMETER OF PIPE.	DEPTH. 6 ft.	DEPTH. 8 ft.	DEPTH. 10 ft.
	s. d.	s. d.	s. d.
6 inches - - -	– 8½	– 11	1 –
9 „ - - - -	– 9½	1 2½	1 3½
12 „ - - - -	– 11¼	1 3¼	1 7¼

Rateable value and rates.

The rateable value of the property in this district is about 25,000 *l.* A special rate of 4½ *d.* is raised to pay off the principal and interest for the public works, and a general district rate of 2 *d.* to pay salaries. No provision is at present made for repairs to these sewers, inasmuch as the contractor is bound to execute all repairs for the next five years. The general district rate was formerly 5 *d.*, in order to cover the payment for the survey and preliminary expenses.

The water rate appears to be about 3½ *d.* in the pound, varying slightly with different houses.

Results of Examination.

I regret that I was not enabled to institute so full and complete an examination of the sewerage of Tottenham as I could have desired; but after such an investigation as I had the means of making, the impression left upon my mind is, that this town does not yet afford the experience which is required to establish the advantage and economy of so general a use of pipe sewers, especially of such small sizes, but that the arrangements introduced here by Mr. Pilbrow for the supply of water for flushing, and for other purposes, are superior to those which I have witnessed in the other towns I have visited.

Extract from an Account furnished by the Local Board of Health for draining one house at Tottenham.

"The under-mentioned amount may be paid to the Local Board of Health immediately, buf if not so paid, it will remain at interest; the whole to be paid off within a period not exceeding 30 years, by means of a private improvement rate to be levied on the premises:—

"No. 412

" No. 412.

Tottenham Local Board of Health, May 3, 1853.

Mr. Owner.

Mr. Occupier of one house, situate at High-street, Tottenham.

To the Local Board of Health, per ' Private Improvements' under Contracts, Nos. 15, 16 and 17.

No.	Yds.	ft.	in.		s.	d.	£.	s.	d.
				Water Supply.					
				Wrought Iron Pipes, &c.					
	0	64	6	1-inch galvanized, and laying and fixing - - - - - at	-	10¼	2	15	1¼
	0	36	6	¾-inch, and ditto - - - - „	-	7¾	1	3	7
1	-	-	-	1-inch bend - - - - „	-	9¾	-	-	9¾
2	-	-	-	¾-inch ditto - - - - „	-	8½	-	1	5
5		-	-	1-inch T pieces - - - „	1	3	-	6	3
4	-	-	-	¾-inch ditto - - - - „	1	1½	-	4	6
1	-	-	-	1-inch elbow - - - - „	1	2	-	1	2
3	-	-	-	¾-inch ditto - - - - „	1	1	-	3	3
15	-	-	-	¾-inch plain sockets - - „	-	4½	-	5	7½
2	-	-	-	¾-inch reducing sockets - - -	-	5½	-	-	11
6	-	-	-	Nipples, 5¾-inch, at 5½*d.*; 1½-inch, at 3½*d.* - - - - - -	-	-	-	2	7
½	-	-	-	1-inch ferule, as fixed - - „	1	9¾	-	-	11
1	-	-	-	Stop-cock and fitting (common) „	-	-	-	7	3
3	-	-	-	¾-cocks ditto (screw down) - „	4	4	-	13	-
½	-	-	-	Plug-box - - - - „	5	6	-	2	9
2	-	-	-	Preventer fixed - - - „	20	-	2	-	-
	0	3	0	Lead pipe - - - - „	-	8	-	2	-
				Drainage, &c.					
				Stoneware Pipes, &c.					
	Pipes laying 75	87	6	6-inch laid - - - - „	-	4¾ to 7	4	-	8¾
	0	85	0	4-inch laid - - - - „	-	3⅛ to 5½	3	5	8
	0	95							
	0	26	0	3-inch ditto - - - - „	-	2½ to 5	-	17	11
	0	30							
1	-	-	-	6-inch bend laid - - - „	1	9	-	1	9
6	-	-	-	4-inch ditto - - - - „	1	3	-	7	6
4	-	-	-	3-inch ditto - - - - „	1	-	-	4	-
7		-	-	6-inch junctions laid - - „	1	6	-	10	6
2	-	-	-	4-inch ditto - - - - „	1	1	-	2	2
1	-	-	-	3-inch ditto - - - - „	-	11	-	-	11
1	-	-	-	Junction with sub-main - - -	-	-	-	-	3
1	-	-	-	Pan and trap (common) - - -	-	-	-	5	6
2	-	-	-	- Ditto - (Ridgway's) - -	12	6	1	5	-
1	-	-	-	Yard sinks and fixing - - -	-	-	-	4	-
4	-	-	-	4-inch syphon trap, fixed - - -	3	-	-	12	-
1	-	-	-	3-inch ditto - - - - „	2	-	-	2	-
1	-	-	-	1 fan screw - - - - -	-	-	-	1	-
3	-	-	-	Converting privy into water-closet „	12	6	1	17	6
	7	2	0	Cubic,—Emptying cesspools, filling-in, &c. - - - - „	7	6	2	12	-¾
	4	0	0	Outside paving, brick or stone - „	-	6	-	2	-
				Superintendence, &c., 5 per cent. - -	-	-	1	5	9¼
				Miscellaneous.					
4	-	-	-	Silt pits - - - - - - -	-	-	-	10	-
				Extra for short lengths of galvanized iron pipes - - - - -	-	-	-	2	-
						£.	27	1	4¼

(*continued*)

Correspondence, &c.

	Yds.	ft.	in.		s.	d.	£.	s.	d.
				WATER SUPPLY. *Extra Bill.*					
				Wrought-Iron Pipes.					
	0	30	0	¾-inch galvanized, laying and fixing, at	–	7¾	–	19	4½
	0	28	6	½-inch ditto – – – – „	–	6½	–	14	10½
1	–	–	–	¾-inch bend – – – – „	–	8½	–	–	8½
4	–	–	–	½-inch ditto – – – – „	–	6½	–	2	2
1	–	–	–	¾-inch T piece – – – „	–	–	–	1	1½
1	–	–	–	½-inch ditto – – – – „	–	–	–	–	8½
1	–	–	–	½-inch elbow – – – – „	–	–	–	–	7
4	–	–	–	¾-inch plain sockets – – „	–	4½	–	1	6
2	–	–	–	Bib cocks and fixing (screw down) –	–	–	–	7	9
1	–	–	–	½-inch water meter – – – –	–	–	3	10	–
2	–	–	–	Ball cocks – – – – „	6	–	–	12	–
				DRAINAGE, &c.					
				Superintendence, &c., 5 per cent. –	–	–	–	9	10
				MISCELLANEOUS.					
				To frame, lid, hinges, brick-work, lock, key, &c., for water meter – –	–	–	–	18	–
	0	6	6	3-inch lead pipe, 4 *s.* 4 *d.*; 9 feet of ½-inch ditto, 4 *s.* 6 *d.* – – –	–	–	–	8	10
	0	2	6	2-inch stack pipe, 10 *d.*; 2 feet of sheet lead, 3 *s.* – – – – –	–	–	–	3	10
6	–	–	–	1¼-joints, 6 *s.* 6 *d.*; six wall hooks, 6 *d.*; one 2-inch hopper-head, 2 *s.* 6 *d.* –	–	–	–	9	6
3	–	–	–	¾-joints, 2 *s.* 3 *d.*; extra for short lengths of galvanized pipe, 1 *s.* – – –	–	–	–	3	3
				Fixing water meter, &c.; taking down service from pump, and refixing and connecting iron pipe to rising main; fixing ball cocks; taking down rain water pipe and refixing, &c.—Plumber and labourer, two days five hours – – – – –	–	–	1	2	6
						£.	10	6	6¼

* * *

" To *D. Dowell*,

Builder and Contractor, King-street, Hammersmith, and High Cross, Tottenham.

29th 8 mo. 1853.

To taking up and relaying Paving in Stable, repairing and cleansing Drain, and making Silt Pits in Garden :—

	£.	s.	d.
Bricklayer and labourer, 1½ day – – – –	–	13	6
Groundman, 1½ day – – – – – – –	–	5	3
4 hods of mortar – – – – – – –	–	2	–
2 bushels of lime – – – – – – –	–	1	4
150 paviours – – – – – – – –	–	6	–
To painting front gates – – – – – –	–	7	6
Ditto, best closet – – – – – – –	–	5	–
Whitewashing, &c. – – – – – – –	–	1	6
	£. 2	2	1"

Settled.

(signed) *W. Ware*,

16 October 1853.

With Mr. Dowell's compliments.

SUMMARY.

	£.	s.	d.
First bill sent by Local Board of Health – –	27	1	4¼
Second ditto for extras by ditto – – – –	10	6	6¼
TOTAL charge by Board of Health –	37	7	10½
Bill sent in by Mr. Dowell for similar work – –	2	2	1
TOTAL Cost of Work – –	£. 39	9	11½

ST. THOMAS, EXETER, DRAINAGE.

Correspondence, &c.

The rated district of St. Thomas is situated on the banks of the River Exe, opposite to the city of Exeter. The greater part of it is rural. The town portion consists (1) of the town of St. Thomas, forming the south-western suburb of Exeter, and containing 598 houses; and, (2) of the village or hamlet of Exwick, containing 80 houses, about a mile to the north of the St. Thomas, on the banks of the Exe. Exwick is drained into that river above Exeter. General description.

In the letter to Lord Palmerston from Messrs. Dymond & Sons, the drainage of the two places has been treated as one combined work; but the fact is, that although these places are in the same rated district, and under the same jurisdiction, the drainage works of each are, in truth, as separate and distinct as the drainage of Surrey is from the drainage of Middlesex. The drainage of St. Thomas and Exwick are distinct.

The population of the whole district is about 6,000, and the total number of houses 678; of which, as already intimated, 598 belong to St. Thomas and 80 to Exwick. Population and number of houses.

The subsoil, to the depth at which the sewers are laid, is clean river gravel and shingle, showing, from their appearance, that the lower parts of the district were, at one period, washed by tidal waters. Subsoil.

The surface of the ground at St. Thomas, near the river, is low and flat, whilst that of Exwick has a rapid fall towards the river. Surface and subsoil drainage.

Before the new works were contemplated, the surface drainage was provided for by means of some old brick sewers and cesspools, into which the water was allowed to flow, from considerable distances, over the pathways and along the surface of the streets. These old sewers and cespools still exist, and, in addition thereto, 31 new gullies have now been connected with the new sewers; but the rain water is still allowed to run from the roofs of the houses over the footways and along the street gutters, and, in this respect, the surface drainage is still very defective.

The gravel upon which the houses are built is in itself a natural drain, and mere holes or pits in the ground would convey the liquid refuse of the town into the gravel, whence it would filter without artificial means down to the level of the river Exe. The subsoil forms a natural drain.

The preliminary Report upon St. Thomas was made to the General Board of Health, by Mr. G. T. Clarke, one of their Inspectors, in April 1849. Preliminary Report.

The public sewers of St. Thomas were designed by and executed under Messrs. Dymond & Sons, and they were completed in August 1851. They consist of stoneware socket pipes of London manufacture, varying in diameter from 4 to 18 inches, and in inclination from 1 in 22 to 1 in 1,000. Their average depth below the surface is only five feet, and they are laid in a gravel soil. The main lines are constructed generally either along the roads or across fields. Public sewers of St. Thomas: size, inclination, and depth.

The 18 and 15-inch pipes, comprising the outlet sewers of the suburb of St. Thomas (which are laid at the flattest inclinations), are almost entirely outside the town; and they are flushed frequently from three places constructed for that purpose. Usually they have a considerable stream of water passing through them. With respect to the main body of the sewers in the town itself, which are of smaller dimensions, no means exist of either examining or flushing any of them. And as they have not been inspected since they were laid down, the present condition of the sewers in the town itself must be unknown, because (for the reasons more fully given in my report upon the sewers at Sandgate), when stoppages occur in pipes laid in sand or gravel, the soil receives and discharges the sewage which the pipes cannot convey away, and so the stoppage is not discovered until some accidental circumstance draws attention to it. Means of flushing. Condition of sewers unknown.

The main outfall sewer consists of an 18-inch pipe, which is carried across the fields by the side of the South Devon Railway, for a distance of about a quarter of a mile; it then enters and passes through a brick chamber, and discharges into a large shallow pond of filth, constituting a wide-spreading open cesspool at the foot of the railway embankment. The overflow from this pond is into an adjoining stream of water running by the side of the railway, discharging ultimately, I know not where, as I did not follow it to its termination. The pond here described exposes a large evaporating surface, and is the most disgusting thing of the kind I have yet witnessed; and some means should be immediately taken for its purification or removal. The brick chamber through which the sewage passes is divided into two or three small settling reservoirs, which were no doubt intended to receive the sewage. I was informed by the inspector in charge of the works, that a man comes down occasionally to try various means of saving the manure, and two or three small heaps were pointed out to me as having been collected by him, but none of these have as yet been used upon the land, although, as I am informed, the sum of 20 *l.* per annum is paid for the use of the town sewage. It would thus appear that the works for manure operations, constructed at this point at a cost (including the land) of 700 *l.*, have not, up to the present time, been of any practical utility. Outfall most objectionable. Sewage not used upon lands.

There are from 20 to 30 of the houses in the suburb of St. Thomas which are not connected with the above system of sewers, but have separate lines of pipes with outfalls direct into the River Exe, opposite to Exeter. Houses drained into the river.

The public sewers of the hamlet of Exwick vary from four to nine inches in diameter, and their inclination from 1 in 7 to 1 in 100. There are two separate nine-inch outfall pipes which discharge into a mill-stream, and thence into the River Exe, about a mile above Exeter. Public sewers of Exwick.

No provision has been made, as a general rule, either in St. Thomas's or in Exwick, for the ventilation of the pipe sewers; as an exception to this observation, in two or three instances, the water-spouts from the roofs of the houses have been connected with the upper ends of the pipe sewers for the purpose of ventilating the latter. Ventilation.

Correspondence, &c.

It is stated that none of the pipes have broken since they were laid down; but a general examination of the sewers, or longer experience, is requisite to elicit the fact.

Number of houses drained into the sewers.

The house drainage may be considered to have commenced in August 1851; and I am informed, that in March last there were, in St. Thomas's and Exwick together, 402 houses drained into the sewers; in September last, 580; and at the present time, 640. But this statement requires closer examination.

To a large extent, there is but one water-closet for two or three houses. In particular, one block of 21 houses was pointed out to me which have only seven water-closets amongst them; so that here, in point of fact, No. 1 is drained and has water and a water-closet; whilst Nos. 2 and 3 are undrained, but the inmates are allowed to avail themselves of the drainage provided for No. 1. Now, the Report of Messrs. Dymond would lead me to the supposition that Nos. 1, 2 and 3 have all been drained; whilst, in fact, the cost of the drainage of the one house has been divided amongst the three, to give the average cost of draining each house.

The surveyor was unable to furnish me with the actual number of water-closets which have been constructed and drained into the sewers, and as he could not lend me a copy of the plans to make a more careful examination into these points for myself, I was unable to obtain the information I wanted; but, from what I saw, I think it would be a fair estimate to assume that there is, upon the average, about one water-closet to two houses.

If, then, from 678, the total number of houses in the district, are deducted 80, which belong to the hamlet of Exwick, and are drained by distinct sewers, 38 not yet drained, and 25 which drain by separate outfalls into the river, and assume that the remaining 535 have water-closets at the rate of one to every two houses, and if it is to be understood that a single connected system of sewers is spoken of, we should have 267 instead of 640 water-closets now draining through the main system of pipes into the open cesspool near the railway; 243 instead of 580 so draining in September last; and 168 instead of 402 in March last. The remainder discharge by separate sewers into the River Exe, or the houses are yet undrained.

Thus, upon consideration, it appears that St. Thomas's does not afford the experience as to amount of drainage by pipe sewers, which, from the statements respecting it, it would seem to do.

House drains.

The private sewers and house drains vary in diameter from four to nine inches; the former size is used for a single house. The average inclination is from one in 25 to one in 30.

Combined drainage.

Combined and back drainage has been generally adopted. When the owners of houses were willing to combine in the execution of the minor branches through their property, and at their own cost, they constructed such branches as private works; but when they were unwilling to do so, or objected to their property being intersected by their neighbours' drains, the Local Board, out of the public funds, carried up the branch sewers to the last house in the line, so that there was a strong inducement to all parties not to agree to construct combined works at their own individual cost, but to oblige the Local Board to carry those works out at the cost of the public.

Stoppages in house drains.

There are said to have been about a dozen stoppages discovered in the house drains, from the introduction of improper substances, such as flannel, rags, straw, &c.

Cost of public works.

I endeavoured to obtain from Mr. Benizon, the clerk to the Local Board, the actual cost of the public works, including the preliminary inquiry, engineering, survey, and other charges, so that I might lay the whole of the facts before you; but he stated it would be difficult to obtain this information, and that he did not see how it could affect the object of my inquiry. As he appeared unwilling to give it to me, of course I did not press my application.

The actual cost of the work, as given in the letter of Messrs. Dymonds to Lord Palmerston, exclusive of any of these charges, is set down at 2,371 *l.*

Cost of private works.

The average cost of the private works was stated to me to be 4 *l.* 2 *s.* 6 *d.* per house; but it must be borne in mind that this sum does not represent the actual cost of the drainage works for each house actually drained. If the averages assumed by me above, of one water-closet to two houses, be correct, the cost of private works for draining each house would be 8 *l.* 5 *s.*, exclusive of supervision. Therefore, assuming, in the first place, the present defective provision of one water-closet to two houses to be completed and continued—

Total cost as at present drained.

	£.	s.	d.
The cost for private works would be	2,796	–	–
Ditto public sewers	2,371	–	–
TOTAL	£. 5,167	–	–

And in the absence of more definite information, and reasoning from analogy, as in the case of the other towns, the cost of surveys, supervision, &c., would increase the above amount to from 6,000 *l.* to 7,000 *l.*

If, on the other hand, a water-closet were provided, and water laid on to every house, the

	£.	s.	d.
Private works would amount to	5,593	–	–
Public sewers	2,371	–	–
TOTAL	£. 7,964	–	–

And

And the surveys and supervisions, &c., would make the total cost somewhere between 9,000 *l.* and 10,000 *l.* These estimates are exclusive of the public works for the supply of water, and for the removal of rain water from the surface of the footways, or for any improvement of the outfall. Total cost if completely drained.

The prices at which the works were executed were as follows:— Contract prices.

Excavation and laying pipes, filling in, strutting and shoring, carting away superfluous earth, including all expenses, excepting the cost of the pipes—

	Per foot lineal.
6-inch pipes, average depth being 3 to 4 feet	5 *d.*
9-inch - ditto - ditto - ditto	5 *d.*
12-inch - ditto - ditto - 5 feet	8 *d.*
15-inch - ditto - ditto - ditto	9 *d.*
18-inch - ditto - ditto - ditto	11 *d.*

An additional price of 2 *d.* per foot lineal was paid for removing and relaying pitching; 4 *d.* ditto, for macadamized roads; and 6 *d.* ditto, for pavements. Most of the footpaths are made with round stone pitching, and there is but little pavement in the place.

So far as I could collect from Mr. Bennison (but my information on these points was not quite so full or complete as I could have wished) the rateable value of the houses in St. Thomas's is about 5,000 *l.*, the rateable value of the whole district being about 11,000 *l.* Rateable value.

A special district rate of 7 *d.* in the pound per annum upon houses, and 1¾ *d.* upon land, is raised for the repayment of the money borrowed. A general district rate of 10 *d.* in the pound is raised to cover supervision, repairs, &c.; or, in its stead, a highway rate of 4 *d.*, together with a general district rate of 6 *d.* The water rate amounts to 10 *d.* in the pound, and 1½ *d.* in the pound for public purposes. Rates.

The Exeter Waterworks Company provide St. Thomas's with water upon the system of constant supply. It is obtained from the River Pynes, a branch of the Exe and Culm, about four miles above Exeter. The reservoir is 170 feet above St. Thomas's, and the company are now extending their works. Water supply.

The Superintendent under Mr. Simpson, Engineer of the Company, states, that "the supply of water from the Exeter works to the district of St. Thomas, as near as it can be ascertained, usually exceeds an average of 120 gallons per house per diem.

"In dry weather the gutters are washed occasionally by allowing the water to run from the waterworks plug for about 15 minutes each time. The pipe drains do not at present extend to the whole of the district, but there is a great waste of water, which no doubt tends materially to cleanse them. The pipe drains have not been down a sufficient length of time to ascertain any practical result as to stoppages, or otherwise, which ought to be relied on."

My visit to St. Thomas's was made upon the 1st of February 1854, and I consider the arrangements for its drainage still far from being perfect and complete. I was disappointed in the amount of drainage passing through any one combined system of sewers, and in the length of time during which they have been in action, which I had imagined to be much greater, and I cannot express satisfaction with the outfall arrangements.

In my opinion the works executed here do not, up to the present time, afford any sufficient experience of the success or failure of such an application of pipe drainage.

BARNARD CASTLE DRAINAGE.

Barnard Castle is a small quiet country town, containing about 4,600 inhabitants, and 700 houses. It is situated upon the side of a hill, having a precipitous fall towards the banks of the River Tees. Population and situation.

The town drainage is divided into two separate and distinct systems of sewers: 1. Those sewers originally provided to carry off the road and surface drainage; 2. Another system of sewers recently provided under the General Board of Health, to carry off the house drainage. The latter are again subdivided into public and private sewers. Of the entire number of sewers and drains for house drainage, laid down upon the engineer's plan, extending, in the aggregate, to a length of about 8 miles, 4½ miles, or thereabouts, in length, are marked as public sewers; whilst the remaining 3½ miles, constituting the private sewers and drains, either have been, or will be, executed out of the private funds of the individuals required to construct them. Public and private sewers.

The public sewers (as defined upon the plans), and the main lines for the supply of water, were designed and executed under the direction of Mr. Ranger, the Inspector of the General Board of Health, who had, in November 1848, made the preliminary inquiry into the sanitary state of the town and its drainage, and who was afterwards appointed the Engineer to the Local Board; and they were constructed under the immediate supervision of his assistant, Mr. A. Morgan. These public works were completed in April 1852. From that date the drainage of the town may, with but few exceptions, be considered to have commenced, because, until the house drainage was conveyed into the sewers, the latter remained inoperative, and only came into action in proportion as the private works progressed. Towards and since the completion of the public sewers, the local Board, as far as practicable, have, from time to time, required the owners of the houses, at their own cost, to destroy their cesspools, put up water-closets, lay on water, and construct drains and private sewers from their houses to the public sewers. But inasmuch as these proceedings have, in Public sewers, execution of. Private sewers: progress of drainage.

Correspondence, &c.

in many cases, given rise to much opposition, the Local Board have found it necessary to proceed slowly, and with much caution and forbearance. I have been unable to obtain precise information of the number of houses up to the present time connected with the public sewers, but, so far as I can collect, I believe it amounts to rather more than one-half. It is only as this work advances that the drainage of the town can be said to be growing towards completion.* The house drainage is generally executed, according to Mr. Ranger's plan, by authorized builders in the town, and under the immediate supervision of Mr. Brown, Clerk and Surveyor to the Local Board of Health.

Separation of surface drainage and sewage.

The road and surface drainage continues to be carried off by the previously existing brick drains, and only house drainage, and the rain from the roofs, is allowed to be conveyed into the pipe sewers.

Sizes and inclinations of sewers.

The pipe sewers and drains vary in size from 4 to 15 inches in diameter. The following Table gives the Length and Sizes of the Public Sewers :

Diameter of Pipes in Inches.

	15	12	10	9	8	6	4	Total.
Length in feet -	500	800	645	635	2,366	14,417	5,104	24,467

The natural levels of the surface have afforded such favourable inclinations as can be obtained in but very few other towns in this country. They range from 1 in 5 to 1 in 200, the average or ruling gradient being about 1 in 30.

Form and material of pipes.

The pipes used have socket joints, and they are mainly of fireclay from the neighbourhood of Manchester and Leeds, but some few are stoneware from London. The joints are formed with cement, great care being taken to make them watertight.

No provision for ventilation.

No provision has been made for the ventilation of the sewers or drains.

Back drainage and depth of sewers.

The sewers have been laid at the backs of the houses, or under the side channels of the streets, at an average depth of from 8 to 10 feet below the surface, and they are subjected to little or no traffic over them.

Stoppages in pipes.

There have been but three or four stoppages in the pipes ; indeed, considering the extraordinary falls above named, the small amount of drainage received, and the facility that exists of passing, at any time, a rapid stream of water through the sewers and drains, it would with moderate sized pipes be surprising were it otherwise. The stoppages alluded to are stated to have been occasioned by imperfectly formed junctions, or other avoidable causes. In one instance, however, viz., a 6-inch branch pipe laid near Thorngate, at an inclination of 1 in 200, and receiving the drainage from eight water-closets, stoppages occurred, requiring a considerable length of pipe to be broken up; and the Surveyor has reason to believe that deposit is again accumulating in it, and that, in order to make it efficient, it will have to be detached from the main line, and re-constructed, with a discharge into the River Tees, at a nearer point, so as to obtain a better fall.

Effect of joints not being water tight.

Another cause of stoppage, occurring in a private drain, arose from the joints not having been made water-tight, so that the water escaped through them into the soil, leaving the deposit to accumulate, and cause a stoppage in the drain.

Surveyor's experience.

The surveyor is of opinion, derived from experience, that the successful working of pipe sewers is essentially dependent upon perfect workmanship and water-tight joints, with an abundant supply of water, and the exclusion of surface drainage coming from the roads.

Water supply, reservoirs, &c.

The supply of water for the town is obtained from Stoney Keld Springs, distant about six miles ; it is conveyed thence, by gravitation, through 9-inch stoneware pipes, for a distance of four miles, to a reservoir about 100 feet above the level of the centre portion of the town, and capable of holding about 20,000 gallons ; but this reservoir is too small for the wants of the town, and will shortly have to be enlarged. The supply pipe from the reservoir into the town is an iron pipe seven inches in diameter.

Constant supply.

The system of constant supply is here adopted ; but some inconvenience has been felt from the waste occasioned by careless persons and children leaving the taps open, by which, upon one or two occasions, the reservoir was emptied in the course of the night.

Cleansing sewers.

The fire-plugs are opened and the water allowed to flow through the sewers for about a quarter of an hour once a week, in order to cleanse them.

Private works.

At the time when I inspected these works, I found many of the water-closets and water-pipes frozen up and inoperative; but I was informed that in several instances it arose from the owners having laid the drains and pipes too near the surface, in order to save the expense of excavation, and that, in these instances, the works would probably have to be re-constructed. Some of the householders have excavated the ground for themselves, only 9 or 10 inches deep, and employed a bricklayer only to lay the pipes, doing the rest themselves.

Cost of private works.

The cost of the private works was stated to have amounted to about 5 *l.* per house on the average, which, upon 700 houses, would amount, in the whole, to about 3,500 *l.*; but in many instances, there is but one water-closet to three or four houses. This sum does not, therefore, represent the actual cost of draining each house, but it gives the cost of these works reduced, by being divided amongst a larger number of houses.

The

* The Clerk to the Local Board promised to obtain this information for me more definitely, and I have written to him twice since my visit to obtain it, but have received no reply to my letters. J. W. B.—13th February 1854.

The cost of the works, termed "public works," was, for water supply 4,000 *l.*, and for public sewers 2,000 *l.*; those sums include the engineer's professional charge of 397 *l.*, and all other charges for supervision, but they are exclusive of the cost of the survey (which is not yet paid), and the preliminary inquiry of, and Reports by, Mr. Ranger. Taking into account these additional items, the cost of the house drainage and water supply of this town will, when completed, amount to a sum of, probably, 10,000 *l.*; but this, it must be borne in mind, is irrespective of the cost of the sewers for surface and subsoil drainage, and of the proposed enlargement of the reservoirs. The estimate would stand thus:— Cost of public works.

	£.	s.	d.
Water-works	4,000	–	–
Public sewers	2,000	–	–
Private works (upon reduced estimate, by being divided amongst a larger number of houses)	3,500	–	–
Survey and preliminary inquiry, &c., say	500	–	–
	£. 10,000	–	–

The rateable value of the property included in the district rated to the works here described is about 6,000 *l.*, and a rate of 1 *s.* 6 *d.* in the pound per annum is charged upon the whole of the property in respect of the public works, in addition to a charge of 2 *d.* in the pound per annum for the private water supply to all consumers. The charges for supervision, maintenance and repairs of the double system of pipe and surface drainage sewers, are paid for out of a rate called the "General District Rate," amounting to 4 *d.* in the pound. Payment for works by rates.

As the local circumstances under which drainage works are constructed vary so considerably, it would be perfectly idle to institute a comparison, either as to cost or in any other respect, between the drainage of two distinct places, without a full consideration of the circumstances applicable to each. And this observation applies with peculiar force where an attempt is made to compare the drainage of a great city like London with that of a small town or village in a distant province, or in a rural district. The nature of the soil and surface; the nature and quality of the roads; the amount of traffic over them; the weight and proximity of the buildings; the existence or non-existence of cellars under the houses and streets; the rate of wages; and a variety of other circumstances, must not only govern the kind of structure best adapted to the locality, but will also have a material influence upon its cost and the difficulty of its execution. One very heavy item in London, which has scarcely a parallel in a small country town, consists in the cost of strutting, shoring, lighting, fencing and watching, and taking those other necessary precautions against accidents and danger to buildings and the inhabitants, as well as to passengers in the streets, which are indispensable in a large and crowded city with enormous traffic. By way of illustration, I may mention, that the contract prices for laying 6, 9 and 12-inch pipes, at the depths of 6 and 10 feet respectively, exclusive of the cost of the pipes, are as follows, in London and at Barnard Castle:— No just comparison between London and small country towns, as to drainage.

Comparative Cost of similar Work at *London* and *Barnard Castle*.

Diameter of Pipe.	Depth laid.	Cost, per Yard Lineal.		Excess of Cost for similar Description of Work in London over Barnard Castle.
		At London.	Barnard Castle.	
Inches.	*Feet.*	*s.* *d.*	*s.* *d.* *s.* *d.*	*s.* *d.* *s.* *d.*
6	6	2 3	from – – 8 to – 9	from – 1 7 to 1 6
–	10	3 10½	„ – 1 6 to 1 8	„ – 2 4½ to 2 2½
9	6	2 4½	„ – – 8½ to – 10½	„ – 1 8 to 1 6
–	10	4 –	„ – 1 6¼ to 1 9	„ – 2 5¾ to 2 3
12	6	2 4½	„ – – 9¾ to – 10½	„ – 1 6¾ to 1 6
–	10	4 –	„ – 1 8¼ to 1 10½	„ – 2 3¾ to 2 1½

Now, in London, the cost of merely relaying the pavement would amount to from 1 *s.* to 1*s.* 10 *d.* per yard lineal, which in most cases exceeds the whole cost per yard of laying the sewers at Barnard Castle, exclusive of the material. But it is also the fact that the average depths of sewers in London is of necessity nearly double that of the sewers in our country towns and villages.

My visit to Barnard Castle was made on the 2d of January in the present year, and I there found that opinions were divided as to the necessity and advantage of the works I have described. Some of the statements of the residents went to show that the system pursued has not been successful.

For the information I am enabled to lay before you respecting the drainage works executed in this town, I am indebted to Mr. Brown, who acts as clerk and surveyor to the Local Board, and who is well acquainted with the drainage of the place.

Correspondence, &c.

Barnard Castle Local Board of Health.

Contract Prices at which the Stoneware Drain Pipes were delivered.

Internal Diameter of Pipe.	Probable Number required.	Length of each Pipe in work.	Coned and rebated Joints. Price per Pipe.
		Ft. in.	*£. s. d.*
15 inches	680	2 6	– 4 2
12 inches	336	,,	– 2 9
10 inches	260	,,	– 2 3
9 inches	208	,,	– 1 10½
8 inches	796	,,	—
6 inches	5,364	,,	—
4 inches	4,320	,,	– – 10
Tapering Pipes.			
Figs. from 1 to 16:			
From 15-inch to 12-inch diameter	1	2 6	– 6 –
From 12-inch to 10-inch ditto	1	,,	– 4 –
From 10-inch to 9-inch ditto	1	,,	– 3 4
From 9-inch to 8-inch ditto	1	,,	– 2 10
From 8-inch to 6-inch ditto	2	,,	– 2 6
From 6-inch to 4-inch ditto	22	,,	– 1 10
Curved Pipes, 10 feet radius.			
Figs. 7 and 8:			
6 inches	10	,,	– 1 10
4 inches	27	,,	– 1 3
Single Junction Pipes.			
Figs. 9 to 22:			
8-inch branch on 15-inch pipe	1	2 6	– 6 –
6-inch branch on ditto	4	2 6	– 6 –
4-inch branch on ditto	2	,,	– 6 –
6-inch branch on 12-inch pipe	6	,,	– 4 –
4-inch branch on ditto	6	,,	– 4 –
6-inch branch on 10-inch pipe	3	,,	– 3 4
4-inch branch on ditto	3	,,	– 3 4
6-inch branch on 9-inch pipe	3	,,	– 2 10
4-inch branch on ditto	3	,,	– 2 10
6-inch branch on 8-inch pipe	8	,,	– 2 6
4-inch branch on ditto	16	,,	– 2 6
6-inch branch on 6-inch pipe	8	,,	– 1 10
4-inch branch on ditto	412	,,	– 1 10
4-inch branch on 4-inch pipe	380	,,	– 1 3
Double Junction Pipes.			
Figs. 3 to 26:			
8-inch diameter, diverging into 2 pipes each, of 6-inch diameter	1	2 6	– 3 4
6-inch, 3 pipes of 4-inches	4	,,	– 2 6
6-inch, 2 pipes of ditto	10	,,	– 2 6
4-inch, 2 pipes of ditto	3	,,	– 1 8

Barnard Castle Local Board of Health.

Contract Prices at which the Iron Socket Pipes and Castings were delivered.

Internal Diameter of Pipes, and Number of Belts.		Thickness of Metal in Barrel.	Number of Pipes required.	Mean Weight of each Pipe.	Permitted Deviation from prescribed Mean Weight.	Length of each Pipe in Work.	Price per Ton.	Price per Pipe.
Inches.	*Belts.*	*Inches.*		*Cwt. qrs. lbs.*	*lb.*	*Ft. in.*	£. *s.* *d.*	£. *s.* *d.*
1½	1 belt under socket.	·288	245	– 1 –	1½	4 6	6 3 6	– 1 7
2		·300	237	– 1 21	2	6 –	5 8 6	– 2 4½
2½		·313	436	– 2 5	2½	6 –	5 8 6	– 2 11½
3		·325	351	– 3 24	3	9 –	5 3 6	– 5 –
4		·350	313	1 1 12	4	- -	5 3 6	– 7 –
5		·375	258	1 3 6	5	- -	5 3 6	– 9 4
6		·400	199	2 1 4	6	- -	5 3 6	– 11 10
7		·425	681	2 3 8	7	- -	5 3 6	– 14 8
8		·450	- -	3 1 15	8	- -	5 3 6	– 17 6
9		·475	- -	4 – 2	9	- -	5 3 6	1 1 –
10		·500	- -	4 2 21	10	- -	5 3 6	1 4 3

Branches, bends, taper pipes, fire-plug pipes, cock and plug castings, and other similar castings, not exceeding six inches internal diameter, and made from the cupola or air furnace, at - - - - 2 *s.* 6 *d.* per cwt. extra.
Branches, bends, taper pipes, fire-plug pipes, cock and plug castings, and other similar castings, six inches diameter and not exceeding twelve inches diameter, and made from the cupola or air furnace, at - - - - - - - - - - - - 2 *s.* - ditto.
Boring fire-plug branches, at - - - - - - - - - - - - 15 *s.* per ton.

Barnard Castle Local Board of Health.

Contract Prices for laying Water Pipes, including every Expense.

Description of Pipe.		Price per Lineal Yard measured in Work, and including all Appendages, except those hereinafter mentioned.		
Diameter.	Length in Work.	If laid in Paved Streets or Roads.	If laid in Macadamised Streets or Roads.	If laid in Unpaved Streets or Roads.
Inches.	*Feet.*	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*
1½	6			
2	6			
2½	6	– – 6	– – 5	– – 4
3	9			
4	9			
5	9			
6	9	– – 8	– – 7	– – 6½
7	9			

Extra to fixing slide valves, with cast-iron casings and spindles complete, each :—

1½ Inch.	2 Inches.	2½ Inches.	3 Inches.	4 Inches.	5 Inches.	6 Inches.	7 Inches.
Nothing.	—	—	—	—	—	—	—

Extra to fixing hydrants and fire-plugs, including brickwork, casings in Roman cement, and cast-iron covers, each - - £. 1 – –
Extra to paving 3 feet square round hydrants and fire-plugs, in Macadamised and improved streets and roads, each - - – 10 –

Barnard Castle Local Board of Health.

Contract Prices for laying down Drain Pipes, including every Expense.

Schedule, No. 2.

Stoneware Pipes. If laid in Paved Streets.

Description of Pipe.		Price per Lineal Yard, measured in Work, and including all Appendages.													
Diameter.	Length in Work.	Above 3 Feet deep, and not exceeding 4 Feet.	Above 4 Feet, and not exceeding 5 Feet.	Above 5 Feet, and not exceeding 6 Feet.	Above 6 Feet, and not exceeding 7 Feet.	Above 7 Feet, and not exceeding 8 Feet.	Above 8 Feet, and not exceeding 9 Feet.	Above 9 Feet, and not exceeding 10 Feet.	Above 10 Feet, and not exceeding 11 Feet.	Above 11 Feet, and not exceeding 12 Feet.	Above 12 Feet, and not exceeding 13 Feet.	Above 13 Feet, and not exceeding 14 Feet.	Above 14 Feet, and not exceeding 15 Feet.	Above 15 Feet, and not exceeding 16 Feet.
Inches.	*Ft. in.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
4	2 6	- -	- 6½	- -	- 9	- -	- -	1 8	- -	- -	2 9	- -	- -	5 -
6	2 6													
8	2 6													
9	2 6	- -	- 7½	- -	- 10½	- -	- -	1 9	- -	- -	2 10	- -	- -	5 1½
10	2 6													
11	2 6													
12	2 6	- -	- 8	- -	1 -	- -	- -	1 10½	- -	- -	3 -	- -	- -	5 5
15	2 6													

Schedule, No. 3.

Stoneware Pipes. If laid in Macadamised Streets or Roads.

4	2 6														
6	2 6	- -	- 5½	- -	- 8	- -	- -	1 6½	- -	- -	2 7	- -	- -	4 10
8	2 6														
9	2 6	- -	- 6	- -	- 9	- -	- -	1 7	- -	- -	2 8½	- -	- -	4 11
10	2 6														
11	2 6														
12	2 6	- -	- 7	- -	- 10½	- -	- -	1 9	- -	- -	2 10	- -	- -	5 2
15	2 6														

In addition to the above prices, 3*s.* 6*d.* for every cubic yard of rock cut, in the event of meeting with rock.
Also 1¼ *d.* per lineal yard, in addition to the scheduled prices, for puddling and clay puddle, according to the Specifications, when puddling matter is found in the street.

Schedule, No. 4.

Stoneware Pipes. If laid in Unpaved Streets, Roads or Places.

4	2 6														
6	2 6	- -	- 5	- -	- 8½	- -	- -	1 6	- -	- -	2 8	- -	- -	4 9½
8	2 6														
9	2 6	- -	- 5½	- -	- 8½	- -	- -	1 6½	- -	- -	2 8½	- -	- -	4 10½
10	2 6														
11	2 6														
12	2 6	- -	- 6½	- -	- 10½	- -	- -	1 8½	- -	- -	2 9½	- -	- -	5 1½
15	2 6														

Schedule, No. 5.

Stoneware Pipes. If laid in Gardens or open Fields.

4	2 6														
6	2 6	- -	- 4¾	- -	- 8¼	- -	- -	1 6¾	- -	- -	2 7¾	- -	- -	4 9¼
8	2 6														
9	2 6	- -	- 5¼	- -	- 8¼	- -	- -	1 6¼	- -	- -	2 7¼	- -	- -	4 10¼
10	2 6														
11	2 6														
12	2 6	- -	- 6¼	- -	- 9¾	- -	- -	1 8¼	- -	- -	2 9¼	- -	- -	5 1
15	2 6														

Concluding

Concluding Remarks.

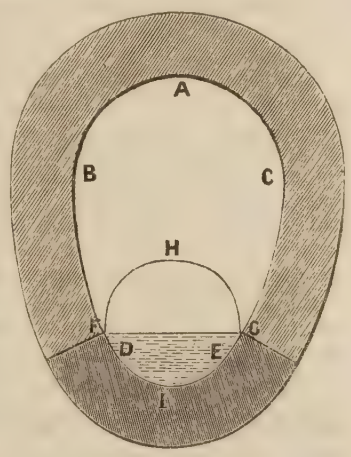
As much misapprehension exists upon the relative value of pipe sewers as compared with brick sewers, I may be allowed very briefly to recall to your attention the few simple reasons which render brick sewers of the form now generally adopted in London preferable, as a rule, to pipe sewers, for the drainage of large towns. The rule upon this, as upon almost every other subject, must of course be open to occasional exceptions.

Every one acquainted, however slightly, with hydraulic engineering, knows that the rapid conveyance of a fluid is essentially promoted by a smooth bore, and a channel so circumscribed as to present the least possible frictional surface, as compared with the sectional area of the fluid. It cannot be denied that these conditions are fulfilled in each separate length of a properly-made glazed stoneware pipe, of a diameter proportioned to the quantity of fluid to be discharged. Nevertheless, in town drainage, there are other considerations of no less moment, which often compel the engineer to forego an advantage in one direction, to secure equal or greater advantages in another. This will appear when we consider the complex duty to be discharged by the sewers of a large town.

Such sewers have to provide for three distinct objects—house drainage, subsoil drainage, and surface drainage. The house drainage may be considered as tolerably uniform in quantity, and the subsoil drainage nearly so. But the quantity of the surface drainage is very variable; in times of heavy rain greatly exceeding the average quantity, and demanding a proportionate provision to meet such extraordinary exigencies.

Now, pipe sewers, though adapted for house drainage, under the conditions I have already mentioned, are not adapted simultaneously either for subsoil or for surface drainage. When, therefore, in a large town, pipe sewers are laid down for house drainage, the subsoil and the surface drainage must be provided for by a second system of sewers as numerous at least as the others, and of larger dimensions. It is therefore a manifest fallacy to compare, either in cost or otherwise, pipe sewers performing a single duty, with brick sewers performing a triple duty. The comparison, to be worth anything, should be instituted between the double system of sewer required under the one practice, with the single system which suffices in the other.

On the other hand, the London egg-shaped sewers are admirably adapted to answer the triple purpose to which I have adverted. And I may select for illustration the ordinary size used,—namely, a sewer of 9 inch brickwork, 3 feet 9 inches high, by 2 feet 6 inches wide internally.



Its crown, B A C, is a semicircle of 30 inches internal diameter. Its sides, B D and C E, are segments of circles, whose diameters slightly exceed 8 feet. Its invert, D I E, is a segment (about 116 degrees) of a circle of 18 inches diameter. The invert, and also a small portion of each side (D F and E G), extending somewhat above the ordinary height of the sewage flowing through the sewer, are composed of a hard impermeable brick, laid in cement.

It thus appears that (with the ordinary flow) the sewage runs through an 18-inch channel, differing (so far as the part of the sewer actually in use is concerned) in no respect from an 18-inch pipe sewer, except that it is made of hard brick instead of glazed stoneware.

The only supposable disadvantage attending the brick sewer, is in respect of smoothness, and this is more imaginary than real. The pipe sewer, it is urged, has a glazed surface, whilst that of the brick sewer is comparatively rough, and the joints in the latter are much more numerous than in the former. But experience proves that greater nicety is practically attainable in laying the bricks true, than in jointing the pipes; and the inequalities in the joints of the latter, though much fewer in number, cause stoppages more readily than the more numerous, but smaller inequalities, in the joints of the brickwork. Again, after a short time, the surface of brick sewers and pipe sewers alike become coated with a slimy substance, and practically reduces them to an equality in respect of smoothness.

By here and there laying a few bricks dry (or some equivalent device) at or about the level (B C) of the springing of the crown, admission is given to the subsoil drainage far above the level of the ordinary flow of sewage, without at the same time permitting the sewage to escape and saturate the soil.

It is evident that the enlarged upper portion of the sewer provides amply, and with considerable hydraulic advantage in point of form, for extraordinary accessions of storm water. Should any of the numerous substances (such as rags, flannels, straw, scrubbing-brushes, night-caps, kittens, &c.), which cause such serious and often insurmountable obstructions to pipe sewers, get into a brick sewer of the kind here described, so as to block up the ordinary

Correspondence, &c.

channel, there would still be room enough above for the sewage to pass over them; and (if not removed in the meantime by flushing or manual labour) the powerful force exerted by the next storm would wash them to the outlet.

It is needless to dwell upon the great advantage of the large space afforded by the size of the sewer for workmen to enter it for cleasing or repairing it, for removing obstructions, and for remedying any derangement of the house drains running into it, without the costly expedient of breaking up the street, and interfering with the traffic.

I have, &c.
(signed) *J. W. Bazalgette*, Engineer.

APPENDIX.

REPORTS by Local Boards of Health on Pipe Sewerage, addressed to the Right Hon. Viscount *Palmerston*, M.P., Secretary of State for the Home Department.

Rugby, 25th October 1853.
Sandgate, 26th October 1853.
Tottenham, 1st November 1853.

Gentlemen, Whitehall, 8 November 1853.

I am directed by Viscount Palmerston to transmit to you, for your information, and to show the cheapness and efficiency of the tubular system, the enclosed copies of Reports, which his Lordship has received from the Local Boards of Health of the places named in the margin, upon the works for drainage and water supply which have been executed in their respective districts.

I am, &c.
(signed) *H. Waddington.*

The Metropolitan Commissioners of Sewers.

Rugby Local Board of Health,
25 October 1853.

Sir,

In reply to your letter of the 21st instant, I beg to inform you, that a system of tubular pipe drainage has been executed in the town of Rugby. The cost of the drainage was about 4,500 *l.* This sum, together with the amount required for the water supply, was borrowed from the Provident Life Office, London, at 4 *l.* per cent. interest, on mortgage of the rates of Rugby, with liberty to repay the same by instalments of 500 *l.* (two instalments having already been paid). The money to pay this principal and interest is obtained by the rental of the sewage (which is let on lease for 20 years at 50 *l.* per annum), the money received from the sale of water beyond the working expenses, and by two rates in the year upon the property within the drainage area of the district.

The last rate being at the rate of 5 *d.* in the pound, and as the demand of water and the rateable value of the town increases, it is anticipated it will not be necessary to make the rates so high. The drainage has answered very well indeed.

The pipes have not worn out or given way. The cases in which they have been stopped up are very trifling, and from causes which have been easily remedied. The Board consider that the successful working of the system is attributable in a great measure to having a constant and ample supply of water running down the sewers.

(signed) *C. E. Wratislaw*, Clerk.

The Local Board of Health, Sandgate,
26 November 1853.

My Lord,

I beg to acknowledge the receipt of your Lordship's letter of the 21st instant, and to state, in reply, for the information of your Lordship, that the system of tubular drainage adopted by the General Board of Health, and which has been executed here with their sanction, is found to be efficient for the purpose, and of great practical utility in its application to this town.

This system, although not altogether free from objection, is perhaps the only one which could have been employed here with such favourable results. Owing to its relative situation to the sea, being only a few feet above the level of high water, and resting on a bed of shingle, it would have been impracticable to have excavated to a sufficient depth for the construction of brick sewers, with proper working gradients for draining the basements of the houses, to comply with the stipulations of the General Board of Health. For deep drainage under these circumstances, it was necessary, even with the tubular system, to resort to low levels for the attainment of the above object, and for the principal sections inclinations of 1 in 240 and 1 in 320 only could be given. Upon the execution of the work, therefore,

fore, mainly depended its action, as subsequent experience has shown; but soon after its completion it became apparent that a disorganisation existed, which interrupted the flow of matter to the sewage chamber; and on examining the levels, it was discovered that most of the gradients were false, and at variance with the working drawings. Thus, owing to defective workmanship, a portion of it had to be relaid at a cost of 77 *l.* 13 *s.* 3 *d.* to the contractor.

I may here state, that the system is of diminishing glazed stoneware tubes, from 12-inch to 4-inch diameter, discharging their contents into a tank under the beach, with an outfall pipe to the sea at low water. The inconvenience attending the relaying of the defective parts of the work was confined to the re-opening of the street, without (as I am aware) any injurious effects on the public health. The discovery of these defects so early is due to the smallness of the system; had it been larger, a corresponding lapse of time would have taken place; as a natural consequence, effluvia would have been emitted, poisoning the surrounding atmosphere, escaping into the houses, and thereby engendering disease as fearful and fatal as at Croydon.

I should have named, that on opening the ground for the adjustment of the levels, several of the 12-inch pipes were found cracked or split longitudinally, and also that another and greater obstruction was the insecure stopping of the junction holes during the progress of the work with straw and other vegetable substances, which gave way and admitted the shingle into the drains before connecting them with the houses. The attention of the Board was to be given occasionally to defects in the house services; but it is invariably to be attributed either to neglect or to the insertion of foreign substances into them.

For defraying the cost of the combined works of drainage and water supply, the Board negotiated a loan with the Provident Life Office for 3,500 *l*, at 4½ per cent., upon mortgage of the special district rates for 30 years.

The cost of the draining is estimated at 850 *l.*

The operations of the Board in carrying out these important provisions of the "Public Health Act" have been followed by a decided improvement in the health of the district; and when the system shall be more fully developed greater and more beneficial results may be anticipated.

I have, &c.

The Viscount Palmerston, &c. &c. &c.

(signed) *William Pledge*, Clerk.

Tottenham Local Board of Health,
1 November 1853.

Sir,

In accordance with the request contained in your letter of the 21st ultimo, and by direction of the Tottenham Local Board of Health, I have to report that the district of Tottenham was brought under the provisions of the Public Health Act, 1848, by virtue of an Order of Her Majesty in Council, in the year 1850.

Since that period the Local Board have been engaged in executing combined works of drainage and water supply for the whole of the town portion of the district, through the medium of their own engineering officer.

The cost of the combined public works, consisting of the sewers, water mains, artesian wells, reservoirs, steam engines, engine-house, and purchase of land, &c. (including some additional outlay to meet the requirements of the recent extraordinary extension in building operations within the district), has been about 10,000 *l.*

The total length of the sewers and water mains consists of about 12 to 14 miles of each. The funds for the execution of these works have been raised under the provisions of the Public Health Act, by way of loan on the security of a rate called a "Special District Rate," which loan with interest will be repaid in 30 years by equal annual instalments; and the annual rate to meet such instalments is about 5 *d.* in the pound on the rateable value of the property benefited by the works.

The Board have much satisfaction in stating, that the sewers, which consist of glazed stoneware pipes of various dimensions, have answered to their entire satisfaction, no instance having occurred of breakage, stoppage, or other casualty.

Since the completion of the public works, all cesspools have been abolished, and water-closets substituted for privies to the poorest inhabitants.

With reference to the works of sewerage, the Local Board have only to regret the mode of disposal of the sewage, and which has for some time past engrossed their earnest attention.

It is at present conducted into the River Lea, a means of disposal which the Board feel to be very objectionable; and they are now engaged in considering the practicability of adopting some one of the methods which scientific observation has pointed out for deodorising it, and rendering it available for agricultural purposes.

In conclusion, the Board wish to observe that the water supply has in this, as they consider it ought in every district, engaged their first consideration, as no efficiency can be expected in any system of drainage without a constant and copious supply of water.

Correspondence, &c.

In the Tottenham district the use or introduction of cisterns and tanks has been obviated, an abundant and continuous supply of pure water, under pressure, having been conveyed into every house, from the mansion to the humblest cottage, at a very trifling cost, the charge for a cottage rated at 10 *l.* being only 2 *s.* 6 *d.* per annum.

(signed) *W. Heath*, Clerk.

To Henry Fitzroy, Esq.

Gentlemen, Whitehall, 8 November 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a report from Messrs. Dymond & Sons, on the system of pipe-drainage carried out in the district of St. Thomas, Exeter; and I am to recommend the same to your earnest and serious attention with reference to the works to be undertaken for drainage in London.

I am, &c.

The Metropolitan Commissioners of Sewers. (signed) *H. Waddington.*

REPORT on the System of PIPE DRAINAGE carried out in the District of *St. Thomas, Exeter.*

My Lord, Exeter, 31 October 1853.

IN the following report we shall endeavour to supply the information sought by your Lordship in the letter addressed, on the 21st instant, by Mr. Fitzroy to the Clerk of the St. Thomas Local Board of Health.

The district for which pipe sewerage and drainage works have been provided, contains about 678 houses.

The main public sewers are 12,767 feet, or about two miles and two-fifths in length. They consist entirely of glazed stoneware pipes, with socket-joints, and their internal diameters gradually increase from four to six inches at their head to 18 inches at the final outfall. Besides these, there are several public submain sewers or branches, thrown out from the mains, to collect the drains of groups or rows of houses. There are also stoneware pipes, varying from four to nine inches in bore, according to the number of houses or superficial area to be drained: their aggregate length is 1,900 feet.

The expense incurred in public sewerage works is as follows:

	£.	s.	d.
Public main sewers	1,341	10	3
Public submain sewers	90	–	–
Drainage of the surface of public streets, lanes and footpaths	100	–	–
£.	1,531	10	3
Add to this—			
Expense yet to be incurred in the construction of a culvert for the diversion of a natural watercourse, heretofore employed as a public sewer, but now superseded by the new system	140	–	–
£.	1,671	10	3

The above amount forms a part of a sum of 4,000 *l.*, borrowed by the Local Board for the foregoing and other purposes. This loan, with interest at 4½ per cent., will be repaid in less than 30 years by annual instalments. The instalments are met by a special district rate of 7 *d.* in the pound on houses, and 1¾ *d.* in the pound on land.

It should here be stated, that the works of the Local Board include the construction of tanks to receive the sewage at the outfall. The cost of this portion of the works, including the purchase of about one and a half acre of land, a right of way, &c., was about 700 *l.*, a sum which is not included in the above 1,671 *l.* 10 *s.* 3 *d.* These tanks have been let for a term to a chemical manure manufacturer, at a rent which, though moderate, produces a return to the Local Board of about six per cent. per annum on their expenditure upon this portion of their works, or about 1¾ per cent. on the total cost of the public sewers and receiving tanks.

Of the 678 houses lying within the range of the new public sewers, 620 have already been connected with them by pipe drains, 38 yet remain to be so connected, and 20 being about to be pulled down or altered, or from being under peculiar circumstances, do not require to be dealt with at present.

All the private drains are formed of glazed stoneware pipes; those receiving the contents of single water-closets are of four inches diameter, and those carrying off the flow into sinks are of three inches diameter.

All privies and cesspools have been abolished, and water-closets have been substituted for them. As a very considerable amount of house drainage has been executed by parties employed directly by the owners of the property, and not by the Local Board of Health, it is difficult

difficult to ascertain the exact cost of private works, but the following statement is believed to be accurate:—

	£.	s.	d.
Average cost of private drainage works, including erection of water-closets, or conversion of privies into water-closets, per house	2	17	1
Average cost of private water supply	–	18	1
	£. 3	15	2

We now come to the second part of the inquiry, viz., how the drainage has answered, and whether the pipes have worn out, given way, or have been stopped up.

The drainage, both public and private, has fully answered its purpose; the public sewers have now been in use for two years, and although, from the level character of the district, the best inclination to be obtained for the 15 and 18-inch main sewer, is only 1 in 1,000 for a length of 3,347 feet, it has proved fully adequate to carry off not only the ordinary rain-fall and house drainage, but extraordinary storms. No stoppage has occurred in a public sewer, and the greatest amount of deposit in them has been about 1½ inch. This is removed by the natural flushing afforded by rainy weather. As a matter of precaution, it was deemed prudent to provide a simple means of flushing the most level portion of the main sewer, but there has hitherto been no necessity for its use. In the private drains there have been about a dozen stoppages since the new works have been in operation. The poorer classes were accustomed to dispose of refuse of various kinds by throwing it into open pits in their courts or gardens, which served the double purpose of dust-bin and cesspool. It was not surprising that new habits of order and decency were not in all cases formed as rapidly as the new water-closets were completed; and hence half the number of stoppages were found to have been occasioned by pieces of flannel, rags, or straw, carelessly passed into the drain pipe through the closet-pan. These instances are becoming more and more rare as the people discover that the inconvenience and expense arising from such act of carelessness, fall on the perpetrator alone. The other cases of stoppage arose from the washing of fine gravel and sand, from the surface of courts and paths, into the stoneware syphon traps attached to sinks. By a change in the form of the sinks this difficulty has been obviated; we apprehend that both description of stoppage would have occurred, of whatever materials the drains had been constructed. No pipes have worn out, nor do any exhibit a tendency to do so. In short, a properly made stoneware pipe may be regarded as imperishable—a quality which is not possessed by any other material employed in the construction of sewers; pipes have occasionally been broken by careless workmen, before being laid in the ground, but none have given way afterwards. Although the larger sized pipes were not formerly of the thickness which we have in our later works thought it desirable to provide, and although a large proportion of these pipes were laid at a depth of more than 10 feet below the surface, no accident or failure has occurred from external pressure, the weight of superincumbent soil, or any other cause. The nature of the ground in which the pipes for the main sewer were laid —a river gravel, rendered it necessary to exercise much care in filling in the trenches, lest the pipes should be broken by falling stones. The clerk of the works had instructions to see every pipe inserted in its proper direction and level, its bed duly formed, and the filling in at the sides and top cautiously and tightly rammed. Attention to these instructions has rendered St. Thomas free from the accidents and failures which have elsewhere occurred from neglect of these precautions.

The foregoing observations apply more particularly to the special points on which information is sought in Mr. Fitzroy's letter. We take the liberty of adding a few general remarks in conclusion.

St. Thomas is a suburb of Exeter, divided from that city by the river Exe, and bearing much the same relative position with it as Southwark does with London. Like Southwark, too, it is perfectly flat, and though the Exe is not here a tidal river, it often rises many feet in wet seasons and inundates the adjacent country. From these natural difficulties the design and execution of an effectual system of sewerage required more than usual care, and it was not without some degree of professional diffidence that we entered upon the employment of a system of which experience had been very limited, and against which was arranged the weight of great engineering names. But an attentive and unprejudiced consideration of the subject led to the conclusion that sewers of stoneware pipes, within reasonable limits as to size, were the cheapest and best in original construction, and the most manageable and economical in after-use that could be devised.

The result has most completely justified the opinion. Up to about 18 inches in diameter we entertain no question as to the superiority of stoneware over every other material. Below this size it is more economical than bricks, but above it brick is cheaper, and perhaps preferable on other grounds. Stoneware pipes are, in our opinion, unquestionably the best for house drainage, and we are as fully satisfied of their superiority in public sewerage. The choice of them in other places, in which we are engaged in superintending works of this nature, is a practical evidence of this. The chief element of success appears to us to consist in strict and zealous attention to minor details in execution. If this be given, we see no reason to apprehend any damage or obstruction in the main system, and, in the event of their occurrence on private premises, they are readily set right. We have found no difficulty

Correspondence, &c.

in providing, by very simple means, for the removal of noxious gases generated in the sewers, for flushing if desired, and for ascertaining the locality of any stoppages.

We have, &c.
(signed) *Robert Dymond & Sons.*

To the Right Hon. Viscount Palmerston, M. P.,
Secretary of State for th e Home Department.

Gentlemen, Whitehall, 26 November 1853.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a Report which his Lordship has received from the Clerk to the Local Board of Health at Barnard Castle on the combined plan of waterworks and pipe sewerage, which has been adopted at that place.

I am, &c.
(signed) *H. Waddington.*

The Metropolitan Commissioners of Sewers.

My Lord, Barnard Castle, 16 November 1853.

IN reference to the letter addressed to me by Henry FitzRoy, Esq., on 21st ult., requesting me to furnish your Lordship with a report of the system of pipe drainage, &c., adopted in this place, I beg to inform your Lordship that a combined plan of waterworks and pipe sewerage has been carried into effect here at a total cost of about 6,000 *l.*, of which about 1,900 *l.* may be stated to be the proportion for sewerage, and the remainder for the waterworks. The amount has been raised by loan, the interest and annual portions of the principal whereof, distributed over 30 years, are levied by special district rate.

I beg to inform your Lordship, that the Local Board of Health of this place see no reason to doubt that the system of pipe drainage here, combined as it is with water supply, will fully answer the purpose intended by it. We have hitherto had no instances of pipes breaking, giving way, or wearing out. There have been three or four cases of stoppage in branch portions of the work, but all clearly referable to defective workmanship, or careless or wilful conduct. In one instance, the contractors had lost the level laid down upon the Engineer's plan, in bringing up a branch, and it is upon too dead an inclination. Some portions of this branch will, I think, ultimately have to be relaid, at a probable cost of 7 *l.* or 8 *l.* In the other cases, the inlets had been left exposed, with loose coverings, for several days, and large stones and other substances had been placed therein either carelessly or maliciously.

I have to state, that the Medical Officer of the Poor Law Union, and another respectable medical gentleman in the town, have assured me, that during this autumn the town has been unusually free from diarrhœa and other autumnal epidemics.

I beg leave most respectfully to suggest to your Lordship the propriety of investing Local Boards of Health with the powers conferred by clauses 64 to 83 of the Town Improvement Clauses Act (10 & 11 Vict. c. 34), and clauses 28 to 36, inclusive, of the Police Clauses Act (10 & 11 Vict. c. 89).

I have, &c.
(signed) *Geo. Brown,*
Clerk to the Barnard Castle Local Board of Health.

Right Hon. Lord Palmerston.

(Copy.)

My Lord, 17, Stratford-place, Oxford-street, 17 February 1854.

THE Commissioners of Sewers and the Board of Health are at issue as to the cheapest and best way of draining houses.

The Board of Health advocate the drainage of each house block by tubular sub-main running behind the houses, and receiving the sewage of each by a short tubular branch. They recommend a large reduction of the sizes of drains hitherto employed; for the single house drain, they recommend a 4-inch pipe; for the sub-main, receiving several of these, a 6-inch, gradually expanding to 9, 12, and so on, up to 20 inches, as the lengths of the sub-main and the number of branches received by it increase. Such drains, they say, are self-scouring, the run of water through them is so concentrated that it keeps them clear of deposit; the branches being very short, and running backward towards the drain behind, instead of forward beneath the houses, towards a sewer in the street, have a quicker fall, and in case of leakage, leak into the open air, not into the houses; while the cost is so much reduced by this method, that blocks of labourers' houses may be thoroughly drained, and fitted with sinks and soil-pans, for an improvement rate of less than 2 *d.* per house per week.

The Commissioners of sewers, on the contrary, recommend large brick sewers under the street in front of the houses, beneath each of which they carry a long drain from back to front, strictly forbidding more than two houses being relieved by one pipe drain; a system which, whether otherwise good or not, certainly entails an enormous increase of expense on the

the house-owners, and thereby redoubles the resistance on their part to sanitary improvement.

The Commissioners of Sewers lay great stress on the independence secured by their system to each house-owner, whose premises are traversed by his own drain only, which he may take care of or neglect as he pleases, as its stoppage can only injure himself. They allege against the Board of Health plan, that it trespasses on private property; that any stoppage of the tubular sub-main exposes all the houses higher up to suffer, and renders it necessary for workmen to enter private back yards to search out and remedy the evil: they also deny the self-scouring property of the tubular sub-main, and refer, in support of their view, to several hundred cases of stoppages in tubular drains collected in a Report of Mr. Bazalgette.

The Board of Health, on the other hand, declare the householders pretended "independence" on this plan to be illusory, seeing that the big street sewer is, nine times in ten, an elongated cesspool, where the sewage of each stagnates to the detriment of all, while the stoppage of a branch drain running beneath a house on the old plan often causes stench in the houses on either side. Against the inconvenience of an occasional invasion of the back yards by workmen, they set the greater inconvenience of periodical invasions of the street, and stoppage of the traffic, besides tearing up of kitchen floors to get at foul drains under the houses. In reply to Bazalgette's Report, they bring forward examples by hundreds of pipe sewers working admirably year after year, and attribute such stoppages as have occurred to errors incidental to the first introduction of a new system, errors which, once known, may be avoided. Amongst these, they cite the use, at first starting, of drain-pipes, which were too thin, so that they broke under the pressure of superincumbent earth; the uneven laying and careless jointing of pipes by the jobbing builders often employed (as in some part of Croydon) on this work; the use of soil pans with interi as large as the pipe drains to which they led; and, above all, the often scanty and intermittent supply of water to the system. They further point out, that a population accustomed to open privies and cesspools, available as receptacles for solid refuse of every kind, refuse properly due to the ash-pit, have to go through a transitional period of a few weeks while they are learning that such practice leads to stoppage of the new circulating system, and must be abolished along with the old stagnant cesspools. They say, that many of the tubular sewers, put down as failures in Bazalgette's Report, are, at this moment, working perfectly well; for this reason they take all his allegations with very great reserve: they point, with some reason, to Lambeth-square, New Cut, where the Commissioners have allowed 32 houses to be drained by four tubular back drains, which act perfectly well, quite as well as 32 separate drains could act, though these would have cost eight times as much; and they ask why this eightfold cost should be imposed upon London at large by the very same authority which sanctioned in this square the combined drainage which is found to work well.

The controversy is of immense importance, but I forbear further trespass to-day on your Lordship's time.

I am, &c.
(signed) *F. O. Ward.*

No. 122.

Richard Jebb, Esq., to Viscount *Palmerston*, M. P.

My Lord, 1, Greek-street, Soho, 8 March 1854.

In forwarding to your Lordship the accompanying Reports, I have the honour to acquaint you that the Commissioners propose, with your Lordship's permission, to circulate copies of my report on the relative merits of brick and pipe sewers amongst the principal officers of this Commission and others interested in questions of drainage.

I have, &c.
(signed) *Richard Jebb.*

No. 123.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*.

Metropolitan Sewers Office, 1, Greek-street, Soho,
My Lord, 8 March 1854.

The great public inconvenience likely to ensue from a further continuance of the present position of this Commission, induces me respectfully to represent to your Lordship the importance of taking early steps to place matters on a different footing.

Mr. Fitzroy's letter of the 18th ultimo has been regarded by those of my colleagues who now habitually attend the meetings of the Commission as an express

Correspondence, &c.

condemnation by your Lordship of the principles which guide them with respect to essential branches of their official proceedings, and, under that impression, they have intimated to me that they feel precluded from taking any further share in the business of the Commission, than by concurring in certain routine proceedings which are absolutely indispensable, until their successors can be appointed.

Should they adhere to this course, I fear the following results are inevitable: that the execution of new drainage works of the ordinary character, to the value of about 73,000*l.* already decided upon and ordered by the Court of Sewers, must be postponed for several months; that the commencement of the main drainage works embraced in the reports of the engineers of October last, and now awaiting the written sanction of your Lordship for their commencement, must also be postponed; that the consideration and prosecution of further works of a subsidiary and urgent character, to the amount of about 126,000*l.* more, must in like manner be deferred; that the making and collection of a large amount of rates (for the greater part of which the preparations are now complete) must for the present be abandoned; and that large sums of money at the bankers of the Commission, or expected shortly to come in, must remain unemployed; in short, that a suspension of all the more important functions of the Commission must take place for at least six months—results which cannot fail to be productive of great embarrassment in the business of this Commission, at a period too when serious apprehensions of a return of cholera to the Metropolis are entertained. I mention the period of six months, because, even supposing the Commission to be reinforced by several new members, many months must elapse (as experienced on former occasions), before a body, in a large measure new, could accomplish the preliminary investigations requisite for determining the works to be carried out by them, and proceeding with the substantial business of the Commission.

At the two interviews with your Lordship, however, with which I have been recently honoured, I think I collected that my colleagues are in error in the view they entertain of the object of Mr. Fitzroy's letter, and that your Lordship's purpose in directing that communication was not to pronounce a condemnation of the system of drainage pursued by this Commission, but to elicit full materials for enabling your Lordship to arrive at a satisfactory conclusion upon the best system of drainage for the Metropolis.

If I rightly understood your Lordship, and you would kindly authorize me to communicate in open court with my colleagues to that effect, I have every expectation that they will, with your Lordship's approbation, be prepared to proceed with the general business of the Commission during the interval which must ensue until the contemplated changes in its constitution can be carried into operation.

I have, &c.
(signed) *Richard Jebb.*

No. 124.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 9 March 1854.

I HAVE the honour to acknowledge the receipt of your letter of the 7th instant, transmitting, by direction of Viscount Palmerston, for the consideration of the Metropolitan Commissioners of Sewers, a printed copy of a letter from Mr. George Knowles relative to his invention of a filtering tank.

I have, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 125.

The Honourable *H. FitzRoy*, M. P., to the Commissioners of Sewers

Gentlemen, Whitehall, 9 March 1854.

7th March 1854.

I AM directed by Viscount Palmerston to transmit to you the enclosed letter from Mr. Vertue, complaining of the manner in which the work is carried on for the

the reconstruction of the sewer in front of his house in Middle Scotland-yard, annoyance being thereby caused to his family. Correspondence &c.

I am, &c.
(signed) *Henry FitzRoy.*

Enclosure with No. 125.

My Lord, No. 4, Middle Scotland-yard, Whitehall, 7 March 1854.

In the matter of sewers, I take the liberty of calling your attention to the way in which the work is carried on for the reconstruction of the sewer.

The contractor has got possession of this part of Middle Scotland-yard; instead of taking or being obliged to take those precautions to prevent unnecessary disturbance or annoyance, the reverse is the case; before my house the lime is sifted during the day, the mixing of the concrete during the night.

This part of Fife-house which I occupy having no rooms to the back, your Lordship can judge what the sufferings of my family must be under such circumstances.

If this could not have been avoided, any complaint from me would have been discreditable: the place they have chosen for the mixing the concrete during the night is improper in every way.

All I ask, my Lord, is an inspection, which will show what we have had to submit to.

Apologising, my Lord, for intruding on your valuable time,

I have, &c.
(signed) *George Vertue.*

To Viscount Palmerston,
&c. &c.

No. 126.

E. H. Woolrych, Esq., to the Honourable *H. FitzRoy.*

Sir, 1, Greek-street, Soho, 10 March 1854.

I have the honour to acknowledge the receipt of your letter of the 9th instant, transmitting a letter from Mr. Vertue, complaining of the manner in which the works for reconstructing a sewer in Middle Scotland-yard are carried on in front of his premises there, and to state that those letters shall be laid before the Metropolitan Commissioners of Sewers.

I have, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 127.

Honourable *Henry FitzRoy* to the Commissioners of Sewers.

Gentlemen, Whitehall, 14 March 1854.

I am directed by Viscount Palmerston to transmit to you the enclosed letter from Mr. John Pitts, complaining of the injury done to him by the works carried on by direction of the Commissioners of Sewers for the drainage of certain houses, his property. 41, Rochester-road, Kentish Town, 9th March 1854.

I am, &c.
(signed) *Henry FitzRoy.*

Enclosure with No. 127.

My Lord, 41, Rochester-road, Kentish Town, 9 March 1854.

I humbly beg leave to present to you a case of injustice inflicted on me by the Commissioners of Sewers: having a property of small houses situate in Clarendon-place, Somer's Town, which were effectually drained by drains existing for more than 50 years, I received a notice that they were going immediately to make a drain suitable to my houses, and they have dug up the old drain, which was 2 feet 6 inches high and 2 feet wide, running from north to south, and have laid down a pipe 12 inches diameter instead, from south to north; In order to effect which, they have, through a passage between two houses in Gee-street, 4 feet 10 inches wide between the party walls, the opening being 14 or 15 deep, and 6 or 7 feet below the foundations, in consequence of which the tenants have been obliged to quit from fear of being buried in the ruins. I am afraid they are not inclined to do me justice.

Correspondence, &c.

I have given notice in accordance with the 11th & 12th of Victoria; but as the Commissioners do not sit, I am afraid of being drawn into an expensive law-suit, which may be attended with ruin to me. As those houses are my living, I have been induced to address myself to your Lordship, in the hope that you will have the goodness to notice my complaint. From the known goodness and sense of justice I sincerely hope your Lordship will intercede for me, and relieve me from my present anxiety.

I beg, &c.
(signed) *Jno. Pitts.*

The Right Honourable Viscount Palmerston.

No. 128.

E. H. Woolrych, Esq., to the Honourable *Henry FitzRoy*.

Sir, 1, Greek-street, Soho, 15 March 1854.

I HAVE the honour to acknowledge the receipt of your letter of the 14th instant, transmitting to the Metropolitan Commissioners of Sewers a letter from Mr. John Pitts, of 41, Rochester-road, Kentish Town, complaining of injury to certain houses belonging to him consequent upon works in course of execution under this Commission, and to state that those communications shall be placed before the Metropolitan Commissioners of Sewers.

I have, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 129.

Horatio Waddington, Esq., to the Commissioners of Sewers.

Gentlemen, Whitehall, 15 March 1854.

I AM directed by Viscount Palmerston to transmit to you the enclosed copy of a letter, which has been addressed to his Lordship by the General Board of Health, stating that an immediate exercise of certain powers of the Metropolitan Commissioners of Sewers is required for the protection of the public health in the Metropolis.

9th March.

I am, &c.
(signed) *H. Waddington.*

Enclosure with No. 129.

General Board of Health, Whitehall,
My Lord, 9 March 1854.

I AM directed by the Board to submit to your Lordship that an immediate exercise of certain powers of the Metropolitan Sewers Commissioners is required for the protection of the public health in the metropolis.

I am to remind your Lordship that the powers of the Sewers Commission, up to the time of the investigation of the Metropolitan Sanitary Commissioners in 1847–1848, were confined to the formation and care of main sewers, and did not extend to the cleansing of cesspools or the construction of house drains, beyond the regulation of their admission into the public sewers, which was discouraged by the fees charged, and other expenses incurred.

Increased powers were subsequently given to the Commissioners by the Metropolitan Sewers Act of 1848, for the cleansing of cesspools and the promotion of house drainage works, which was intended to be a primary duty, great neglect having been found to prevail in respect to the surface cleansing of the metropolis, and to the paving of those districts chiefly occupied by the poorer classes (much of which is left entirely unpaved). The following were among these additional powers.

Metropolitan Sewers Act, sec. 51: "And be it enacted, that when and so often as it shall appear to the Commissioners that any street or any common stairs or passage or other place common to the inhabitants of several tenements situate within the limits of the Commission, shall not be sufficiently cleansed, or that the refuse therefrom shall not be removed so effectually or completely, or so often as the Commissioners shall deem necessary for the preservation of the public health, decency or comfort, the Commissioners shall cause such street, stairs, passage or place, and also the walls of any houses therein where there shall be an accumulation of filth or dirt, to be effectually cleansed and the refuse to be removed as they shall think fit; and for effecting the purpose of this provision the Commissioners may lay on water-pipes or place plugs and stand-cocks in any streets or public or common places within the limits of their commission: provided always, that where there shall be any paving

paving commission or other persons having under any local Act of Parliament authority to cleanse such streets, stairs, passage or place and to remove such refuse, and such Commissioners or persons shall take order for the effectual cleansing of such street, stairs, passage or place, and the removing the refuse therefrom, at such periods and in such manner as shall be satisfactory to the Metropolitan Commissioners of Sewers, such last-mentioned Commissioners shall, while the same shall be so effectually cleansed and removed respectively, permit the duty of cleansing and removing the same respectively to be resumed or discharged by such Paving Commissioners or persons as aforesaid, without prejudice to the right of the Metropolitan Commissioners of Sewers to resume the exercise of their powers under this provision upon any subsequent default or neglect."

Besides these powers, the Commissioners had entrusted to them additional powers, for the cleansing of sewers, open ditches, &c.

In respect to house drainage works, the same powers were given to them as are contained in the Public Health Act, except that of directing a compulsory supply of water for domestic purposes, when the charge will not exceed 2 *d.* per week.

In a great proportion of houses, however, of the metropolis, water is already available for application to internal cleansing, and, by the exercise of the powers conferred an effectual house drainage may be carried out in a large proportion of cases, as has been effected in some instances already, by individuals, for blocks of houses in the metropolis.

By the Diseases' Prevention Act, this Board are empowered to provide by their regulations and directions for the frequent and effectual cleansing of streets, public ways and places by those charged by law with the care and management thereof; and on the occasion of the last epidemic, it was proposed to issue directions for such cleansing by the Commissioners of Sewers; but the Board abstained from doing so in consideration of the then transitional state of the Commission, and under the belief that the new powers would be efficiently administered. Some works were done; but it was found that the old officers greatly obstructed the exercise of the new powers, and that, as compared with the necessity, the measures were only partially and imperfectly executed.

It appears to the Board that the following measures should be at once proceeded with to meet the emergency :—

An extra body of labourers should be engaged, and pumps provided for the extensive cleansing of cesspools in the poorer districts.

Extra labour should be employed for the more complete flushing and cleansing of the public sewers, stagnant ditches and pools.

The police should be directed to report on surface or other nuisances, and the Commissioners of Sewers should be directed to employ a sufficient staff of men for their removal, and for the surface cleansing empowered by the above-recited section, notice being given to the smaller parishes, where such works are neglected from inability to procure the requisite staff, that the work would be performed in their behalf, rather than as upon their default, if they so thought fit.

Measures should be taken for the extensive cleansing of walls, courts and places by the use of water, and by means of the jet, which was found so efficacious in many instances on the former visitation.

The Sewers Commissioners should be required to apply themselves to the direction of the removal of cesspools and completion of house-drainage works, and for these more immediate works, outlay upon large sewers, and works more especially of eventual use, should be deferred.

I have, &c.

Right Hon. Viscount Palmerston. (signed) *T. Taylor*, Secretary.

No. 130.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 20 March 1854.

I HAVE the honour to inform you, that your letter of the 15th instant, transmitting by direction of Viscount Palmerston the copy of a letter addressed to his Lordship by the General Board of Health respecting the immediate exercise of certain powers of the Metropolitan Commissioners of Sewers shall be laid before the Commissioners at their next meeting.

I have, &c.

(signed) *E. H. Woolrych*, Secretary.

No. 131.

Richard Jebb, Esq., to the Right Honourable Viscount *Palmerston*.

My Lord, 1, Greek-street, Soho, 22 March 1854.

AT the request of the Metropolitan Commissioners of Sewers, I beg to transmit to your Lordship two copies of the report of their engineer, Mr. Bazalgette, upon the

Correspondence, &c.

the drainage and water supply of Rugby, Sandgate, Tottenham, St. Thomas's Exeter, and Barnard Castle.

I have, &c.
(signed) *Richard Jebb.*

No. 132.

The Honourable *Henry FitzRoy*, M. P., to the Commissioners of Sewers.

Gentlemen, Whitehall, 22 March 1854.

I AM directed by Viscount Palmerston to transmit to you for any observations you may think fit to offer thereon, the enclosed letter from Mr. Thomas Moy, relative to your refusal to make a sewer in Prince's-road, Homerton.

16th March.

I am, &c.
(signed) *Henry FitzRoy.*

Enclosure with No. 132.

1, Prince's-road, Queen's-road, Homerton,
My Lord, 16 March 1854.

HAVING lately applied to the Commissioners of Sewers respecting the laying down of a sewer in Prince's-road, Homerton, that body refused to make the same, or to grant any pecuniary assistance to the owners of houses in that road in forming such sewer, although the road is not yet half built upon, and the freeholders would have to lay out a large sum, for which they would have to wait a long time before they could be refunded any part of their outlay, by other parties building and contributing to the sewer. Moreover the Commissioners would allow no sewer less than 18 inches diameter to be laid down, and that to be of bricks in cement.

Now, the several freeholders think that a 12-inch pipe drain would be efficient, economical, and in accordance with the views entertained by the Board of Health. The length of Prince's-road is 470 feet, the south end being considerably lower than the north, and Hackney Brook crosses the south end.

Will your Lordship be so good as to inform me what steps had better be taken, as the property is in a very unhealthy condition for want of drainage, and the cesspools are n a very bad state, and require immediate attention.

I have, &c.
(signed) *Thomas Moy.*

No. 133.

E. H. Woolrych, Esq., to *H. Waddington*, Esq.

Sir, 1, Greek-street, Soho, 23 March 1854.

I HAVE the honour, pursuant to the instructions of the Metropolitan Commissioners of Sewers, to acknowledge the receipt of your letter, transmitting, by direction of Lord Palmerston, a communication from Mr. John Hudleston, of Cornwall-place, Holloway, stating that there is no outlet to a certain sewer in that locality.

I have, &c.
(signed) *E. H. Woolrych*, Secretary.

No. 134.

Richard Jebb, Esq., to the Honourable *Henry FitzRoy.*

Sir, 1, Greek-street, Soho, 24 March 1854.

ON the part of the Metropolitan Commissioners of Sewers, I beg to acknowledge the receipt of your letter of the 22d instant, transmitting a letter addressed to Viscount Palmerston by Mr. Moy (herewith returned), and to state, for his Lordship's information, that the case is one of those in which the obligation to construct a sewer is, by the law, cast wholly upon the parties interested in the property, although the machinery provided for enforcing that obligation is defective. This

obligation

obligation is recognized by the various Acts relating to the drainage of houses in London, incorporated in the Metropolitan Sewers Act of 1848, and by that Act itself. The Commissioners have directed their engineer to report further on the facts of the case, with a view to determining whether it may not be practicable, in order to guard against the creation of nuisances, to compel Mr. Moy, and the other owners of property in Prince's-road, to perform their duty in this respect.

The only application made by Mr. Moy was a verbal application to one of the Branch Offices of the Commissioners, when he was informed by the officer of the district that an 18-inch ½ brick sewer would be required, as, from the necessity which existed of laying the required sewer near the surface, and from the insufficient thickness of pipes then procurable, the construction of a 12-inch pipe sewer would be objectionable. The manufacture being now in course of improvement, it is not improbable that pipes of sufficient strength may soon be procured.

I have, &c.
(signed) *Richard Jebb.*

No. 135.

Richard Jebb, Esq., to the Honourable *Henry FitzRoy*, M. P.

Sir, 1, Greek-street, Soho, 25 March 1854.

The Havering, Dagenham, &c., Sewers Bill was read a second time in the House of Commons on the 8th February.

It has been placed in Group O, and is appointed to be considered in Committee (Committee Room, No. 6), on Monday next, 27th March, at 1 P. M.

The object of the Bill is good: it is to enable the Commissioners of Sewers for Havering, &c., to construct a system of sewers for carrying off the house and town drainage of places within their jurisdiction, between the Rivers Lea and Roding, for which their present powers are inadequate. The sewers for such a purpose must necessarily be at so low a level as to admit of their discharging into the Thames only at low water, unless pumping be resorted to for the purpose of lifting the contents of the sewers into a tank, to be provided near the outlet, for storing the sewage, until about the time of high water, when it can be discharged into the river.

It may be worthy of consideration, whether a clause should not be added to the Bill, requiring the Havering Commissioners to discharge the contents of their proposed sewers within a certain interval from the time of high water. This condition would not interfere with the levels or general object of their scheme. The spot where the Havering Commissioners now propose discharging into the Thames is about half a mile to the west of Barking Creek, at which latter place the Metropolitan Commissioners of Sewers contemplate discharging the contents of the London Sewers at high water only.

The importance of such a condition will appear from the following extract, (p. 20), of the Report of Messrs. Bazalgette and Haywood, on the Main Drainage of London, that report having received the sanction of Sir W. Cubitt:

"The aim of a system of interception is to discharge the sewage of the Metropolis into the river at such a point, and at such level of the tide, as will prevent its return with the flood-tide to the inhabited parts of the town.

"The experiments made by the late Mr. F. Forster show, that in order to effect this object, it is necessary to discharge at as remote a point as Barking Creek, and at about high water. We would here observe, that the delivery of the sewage at high water into the river at any point, is equivalent to its discharge at low water at a point 12 miles lower down the river; therefore the construction of 12 miles of sewers is saved by discharging the sewage at high, instead of at low water."

I have, &c.
(signed) *Richard Jebb.*

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